Coolspring Power Museum's June Show and Swap Meet

GAS ENGINE MAGAZINE

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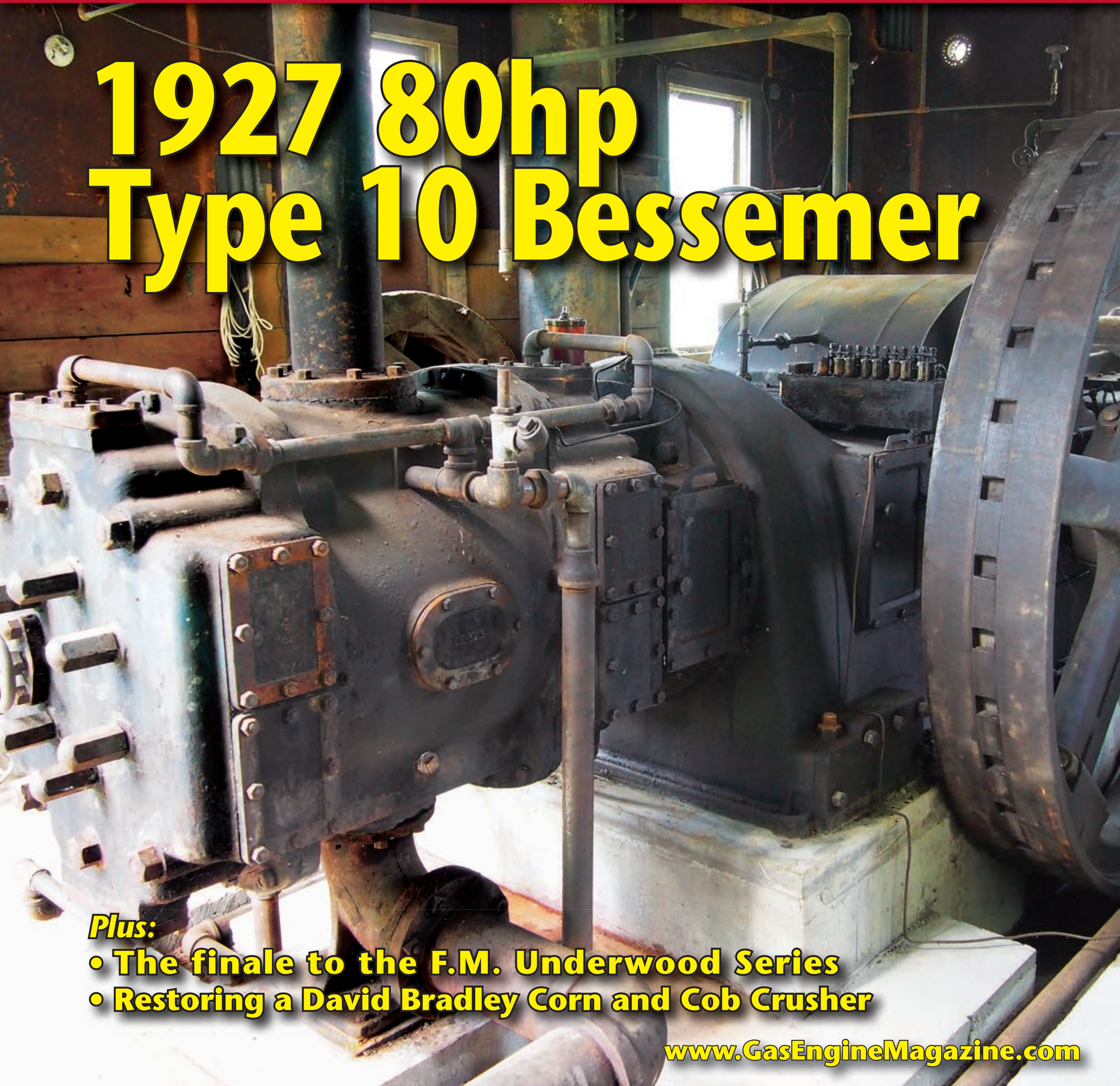

1927 80hp Type 10 Bessemer

Plus:

- The finale to the F.M. Underwood Series
- Restoring a David Bradley Corn and Cob Crusher

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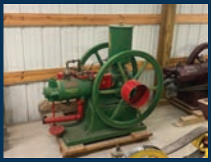

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ON THE COVER: *A 2-cycle combination compressor engine on a combined frame with the power cylinder on one end and a compressor on the other. Read the full story on Page 5.*

ON THE WEB

After sitting in the elements for 110 years, this engine finally gets a chance to run. Watch the video at GasEngineMagazine.com/1904Corliss

Enjoy the sights and sounds of this impeccable 3hp circa 1900 Dudbridge running like a clock. Visit GasEngineMagazine.com/Dudbridge

Hit-and-Miss

Practice makes progress

Admittedly, I do not have experience working on gas engines. The hobby is a niche one and finding someone whose skillset includes writing, editing, publication software, as well as experience working on vintage gas engines specifically, well, that would be a rare duck indeed.

My background is in general maintenance and repair, having held the role of aircraft mechanic in my younger military days and, later in life, I paid the bills briefly maintaining small engines, lawn equipment, riding mowers, and the like. Through my years of learning to repair and maintain different systems, my determination (i.e. stubbornness) has fueled me and paid off. The phrase "practice makes perfect" comes to mind; however, as I have yet to attain perfection in any of my many endeavors, I have decidedly discarded that gem and now consider author Mark Hawthorne's wise words to "adopt the 'practice makes progress' approach."

Practice comes in many forms when learning a new skill. For example, before I was shipped away to technical school to learn to fix airplanes, my master sergeant had me practice safety wiring bolts patterns until my fingers were raw. I'd sit hunched over a model, twisting wires this way and that, counting the twists, measuring the distance, ensuring it was a Z-shape and not an S, checking the tension, and securing the pig-tail ends. He'd critique my results, and I'd rip it out and start over again. This resulted in me being an experienced airman when most others were just learning the skill for the first time. I passed this lab with flying colors.

When I worked on small engines, I was required to sharpen mower blades on a grinding wheel daily. The first several times I attempted this, I was terrible. I couldn't figure out the speed or angle, and I kept making atrocious notches in them or grinding the blades down too far. I went home and mentally berated myself all evening. Not excelling at this task wasn't an option. I knew exactly what to do. The next day I dove into the metal recycle bin outside and collected a stack of old blades. I donned double hearing protection, safety goggles and gloves and spent the end of several work-days practicing sharpening the old blades (and swearing a lot under my breath) until the entire task felt like riding a bike. Workflow plus time and determination got the job done.

The stories we print in *Gas Engine Magazine* often share this common thread. Writers send in historical pieces, such as the series we are wrapping up in this issue about F.M. Underwood, gas engine pioneer, and the evolution of his career and others directly influenced by his progress in the field (Page 20). Collectors share their tales of restoration, learning from mistakes, and how they went about improving their methods the next time around. This is why enthusiasts recommend starting out in the hobby with a cheaper, less-rare engine to learn and practice on.

Like Thomas Edison said when he was asked how it felt to fail when inventing the light bulb. "I have not failed. I've just found 10,000 ways that won't work."

I'd bet good money you all have a story to share about progress through practice. Send them my way.

Until next time,

Christine Stoner
editor@gasenginemagazine.com

GAS ENGINE MAGAZINE

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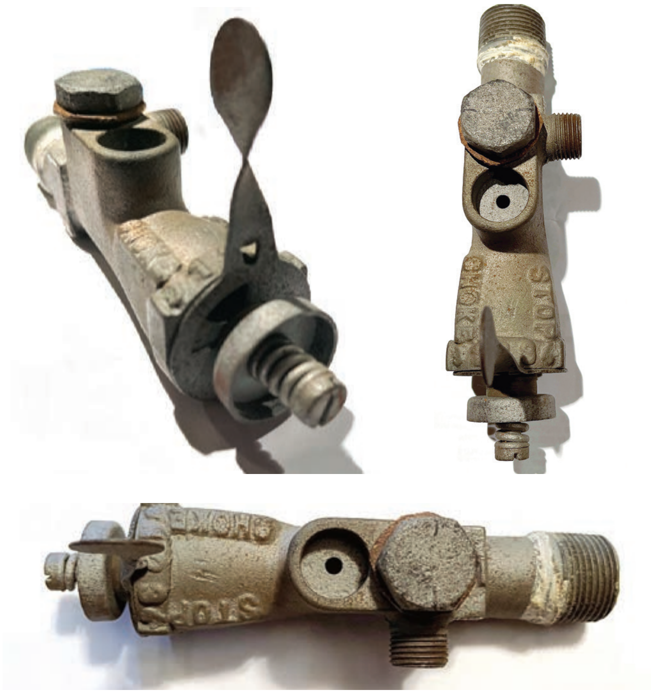
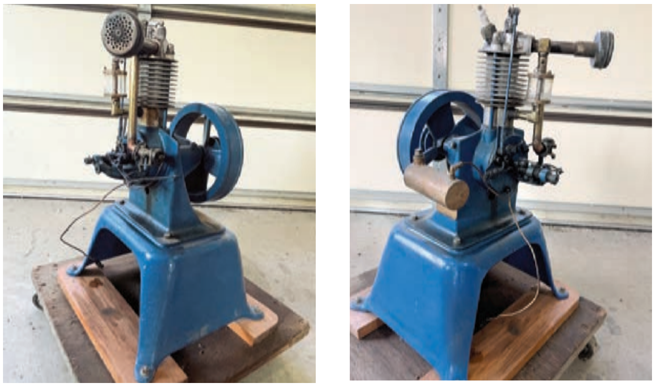
Flywheel Forum





58/3/1: Daughter seeking answers for her father

My father, Frank Lappin, has two questions.

He's looking for information on this fuel mixer (top three photos). What does it fit? Is it for propane?
And we're looking for a manual for this Standard Engine separator. Does anyone know where I can find one?

Thanks for the help!

Michelle Casady (on behalf of Frank Lappin), via email

Readers, send information my way regarding Michelle's father's questions and I'll share it in a future Flywheel Forum. — Editor

58/3/2: Bolens plow engine parts needed

I am looking for an armature magneto, points, and condenser for my Model WI engine. The numbers I have are as follows: Points assembly, 29667; armature magneto, 29671; condenser, 29861.
If you know where I can purchase these or any parts that will work, I would appreciate it. Any information will help, such as alternate numbers, etc.
This engine is on a Bolens plow that was my grandfather's and I still use it.

Thank you,

John Counts, via email

Send helpful numbers or details to me and I'll forward them on to John. — Editor

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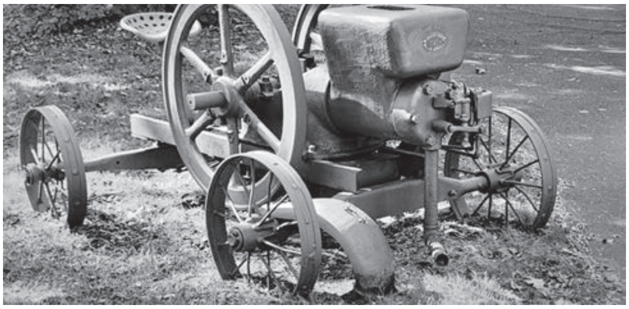


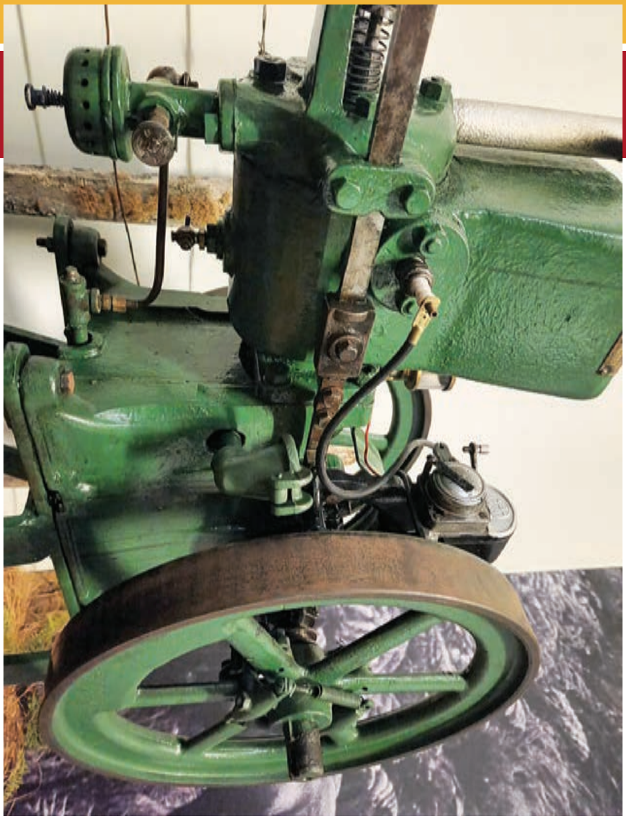
58/3/3: What's it used for?

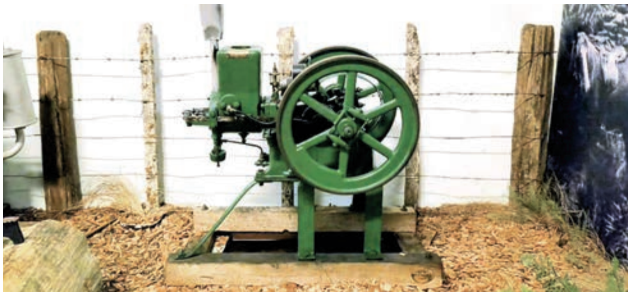
This is at the Bayard Cutting Arboretum in Long Island, New York. I wonder if you have any idea about its use and maker.

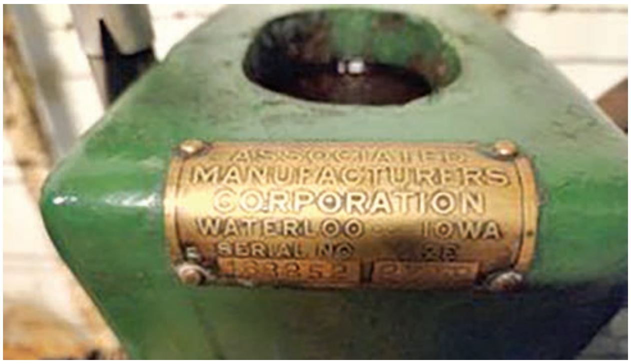
Kevin Griffin, via email

Thanks for writing Kevin! We love a mystery. I'm sure one of our enthusiasts can offer some insight on this engine. — Editor

Please send your questions and comments for Flywheel Forum or your contact information for *GEM* Experts to *Gas Engine Magazine*, 1503 SW 42nd St., Topeka, KS 66609-1265 or email editor@gasenginemagazine.com.



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58/3/4: Museum Associated

Hi there,

I am from The Kauri Museum in Northland, New Zealand. We have an engine in our collection that we believe to have been made by the Associated Manufacturers Co. Our engine is operational, and we were wondering if anyone has any information on this model.

Thank you so much for your help.

Aaron S. Philips, via email

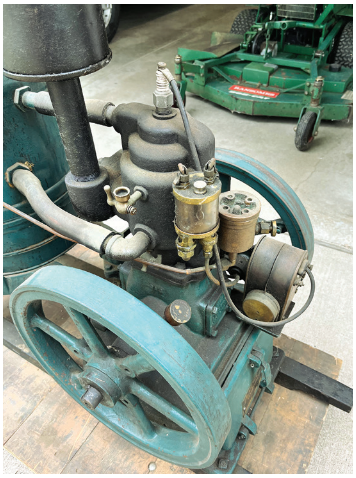
58/3/5: Vertical Bessemer

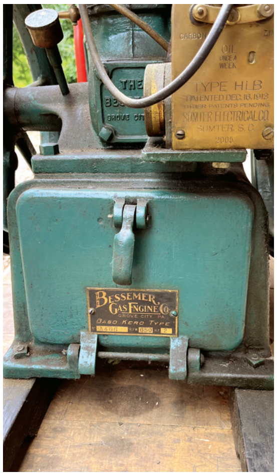
I have a Bessemer Model A-466 2hp vertical engine I'm trying to find information about and its value.

Thank you,

Glenn Vasend, Leonard, Minnesota

Wonderful share, Glenn! Collectors and experts, if you can offer any help on this engine contact me. Thank you in advance. — Editor

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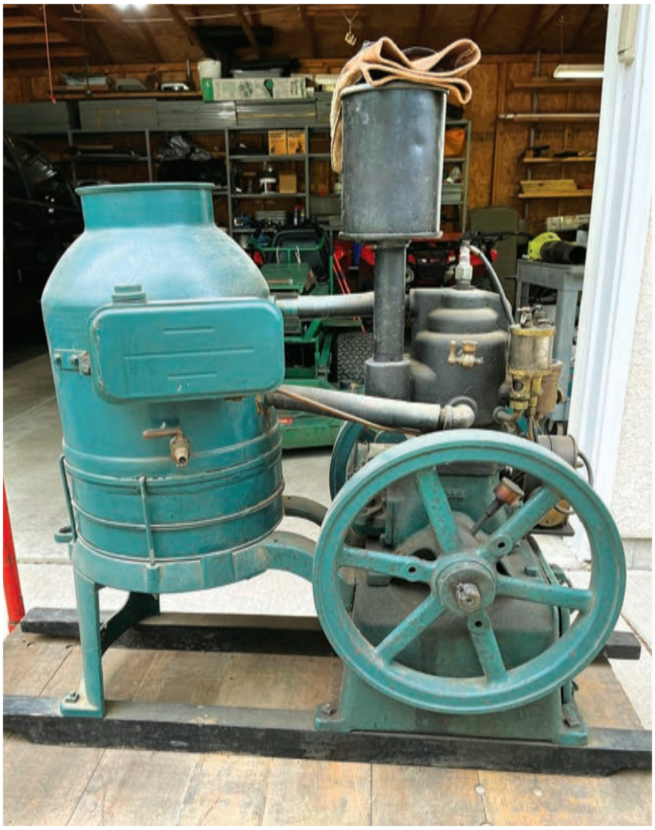
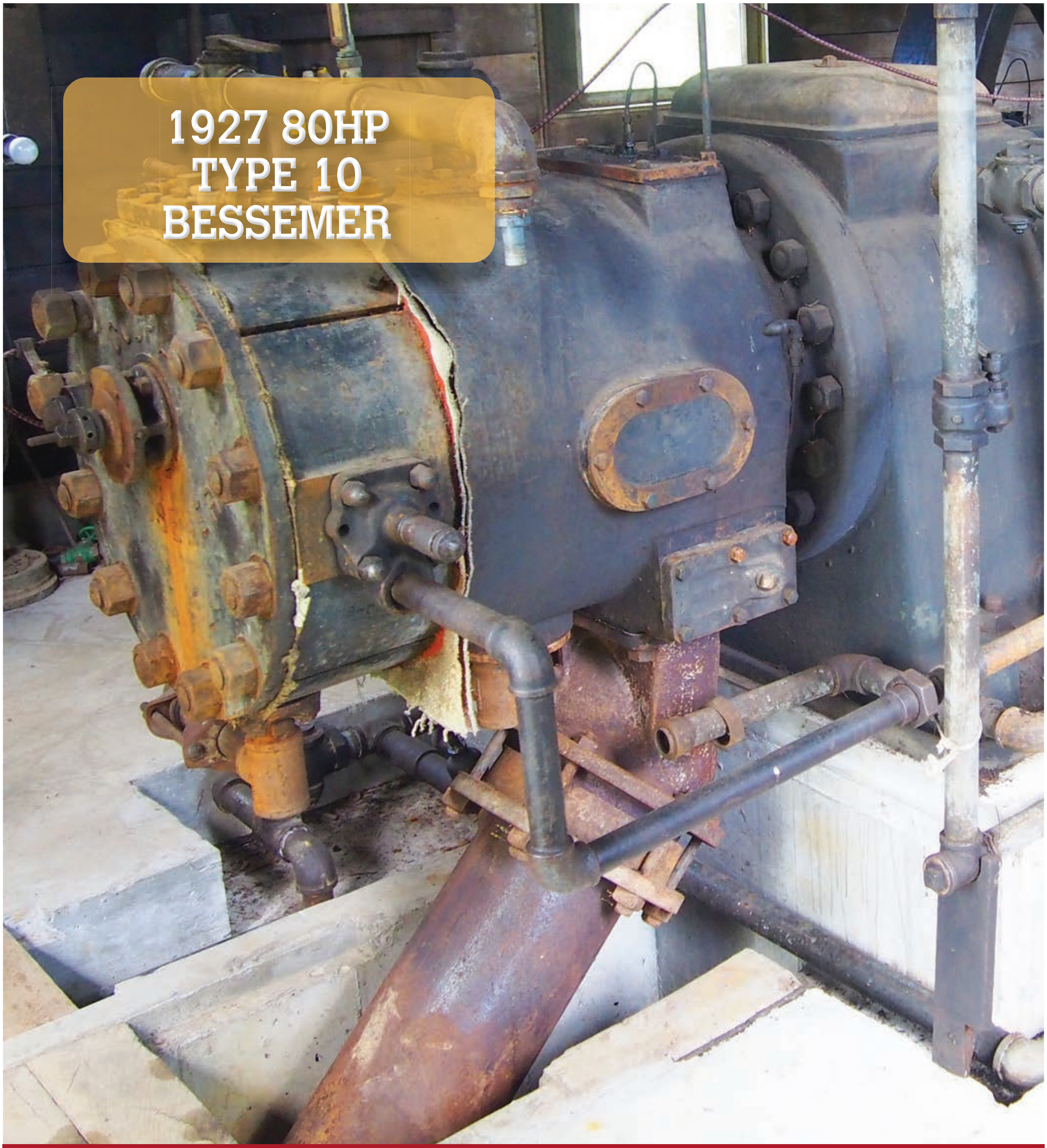
GROVE CITY PA.
GASO KERO TYPE
No A466
RPM 650
HP 2



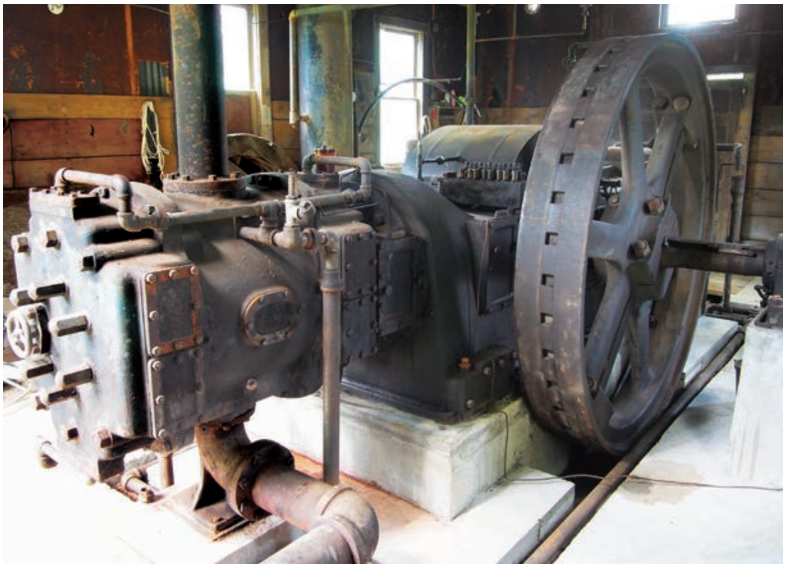
Coolspring Spotlight

The rare and the beautiful from the Coolspring Power Museum

STORY AND PHOTOS BY GAS ENGINE MAGAZINE STAFF



Learn about this engine and 38 others in *Coolspring: Discovering America's Finest Antique Engine Museum, Vol. 2.* Order your copy at www.GasEngineMagazine.com/Coolspring



TYPE X BESSEMER BUILDING
1927 80HP TYPE 10 BESSEMER

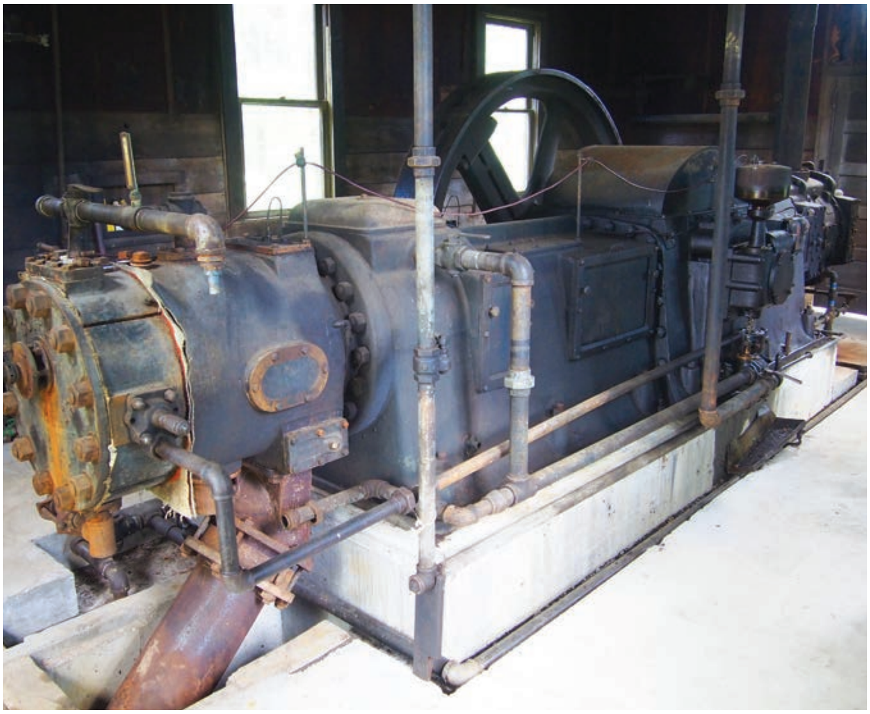
Company	Bessemer Gas Engine Co., Grove City, PA
Year	1927
Horsepower	80
Serial Number	35879
Bore	14-inch
Stroke	20-inch
Owner	Coolspring Power Museum

Bessemer Gas Engine Co. was founded in 1899. It soon grew with sales of thousands of engines, as well as many other kinds of pumping and producing machinery, to the booming oil industry.

FEATURES

The engine is a 2-cycle combination compressor engine on a combined frame; power cylinder on one end with a compressor on the other. The engine has one 7-foot flywheel mounted to one side.

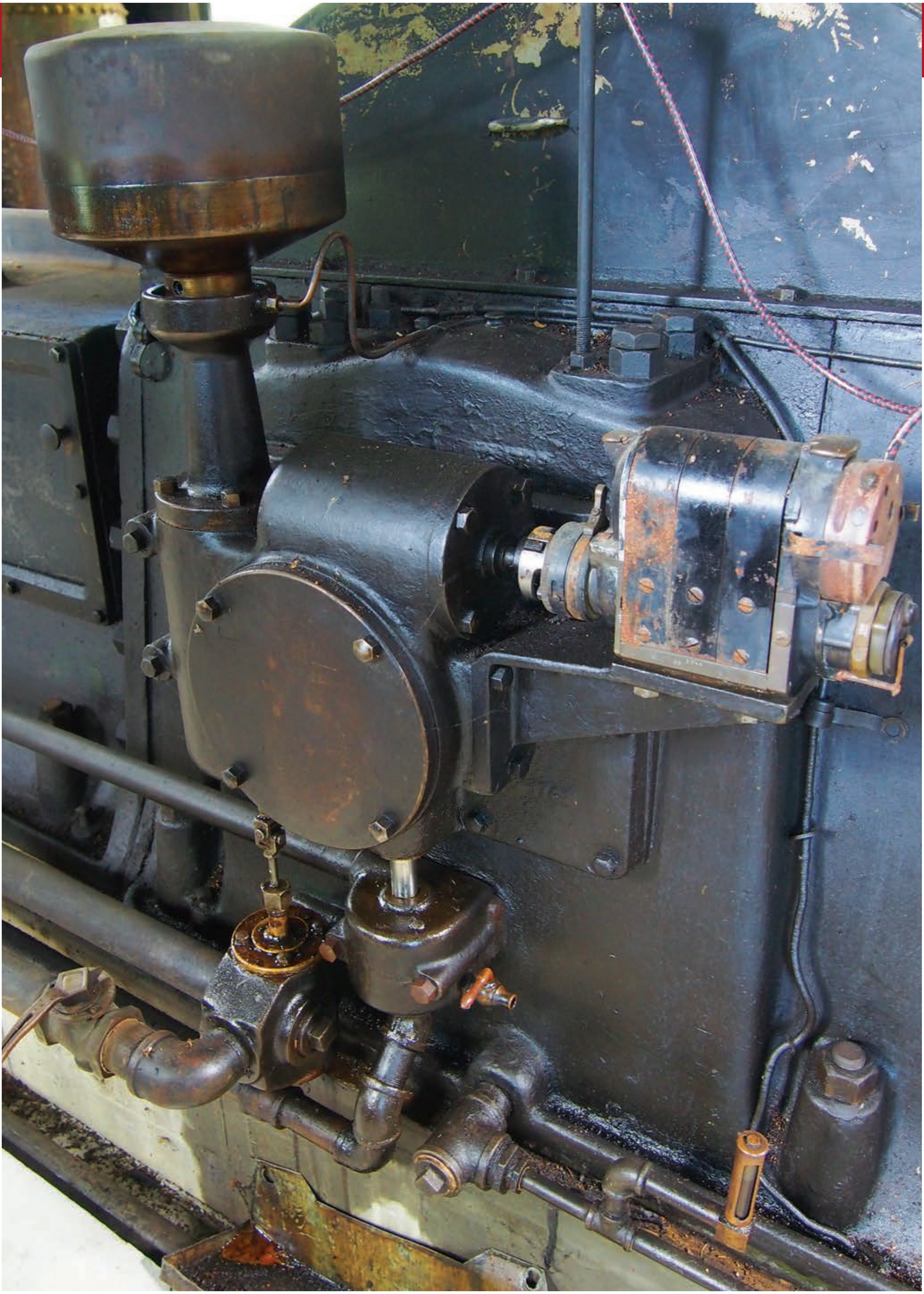
This engine compressor combination was used to provide compressed air to power the many steam engines that pumped oil wells on the oil lease where the Bessemer was located. This was a modern day (1910-1920s) alternative to operating an expensive boiler for the decreasing production of wells that were drilled in the 1880s and 1890s.



The 1927 80hp Type 10 Bessemer is a 2-cycle combination compressor engine on a combined frame with the power cylinder on one end and a compressor on the other. The engine has one 7-foot flywheel mounted to one side (lower left).

HISTORY

This engine was bought by F.J. Mosier in July 1927. It was shipped to his oil lease near James City, Pennsylvania, within a couple of miles of the original location of the Museum's Windy City display.



SMOOTH OPERATOR

Pennsylvania enthusiast shares restoration tale of online engine find.

I purchased this circa-1915 Christensen on eBay. The previous owner had it for a few years but never had it running, so I had my work to do. It had very little compression, the rings were stuck, the intake valve was hanging up and needed cleaned, and the spring was weak. The time side-shaft gear was off so that was next. Also, the shaft was worn and needed replaced. Once the gas line was cleaned, I gave it fresh gas and a good battery and it was ready to start. After a few turns of the flywheel it fired up. I knew then I had a good engine. I disassembled it completely. Glass beaded some parts and soaked others in paint thinner.

While it was apart, I painted it then reassembled it. I had to build a new cart. The gas tank is made from 6-inch stovepipe end caps soldered with fittings. I tried to keep it as close to original as possible. The gas line is made from a 1/4-inch copper tube and soldered. I made a new crank guard.

The Christensen mixer had to be replaced with a Lunkenheimer. The original drooled more than it burned, maybe it just wore out. My son-in-law made a new battery box and did a great job. The pinstripe is by Dan Nunemaker of Honey Brook, Pennsylvania. I made the slide-out hand lifts at each end (shown in the photograph).

I am pleased with all my work and the way it runs. It was well worth the effort.

> "Easiest starting and smoothest running engine in my collection."
>
> — Kenneth

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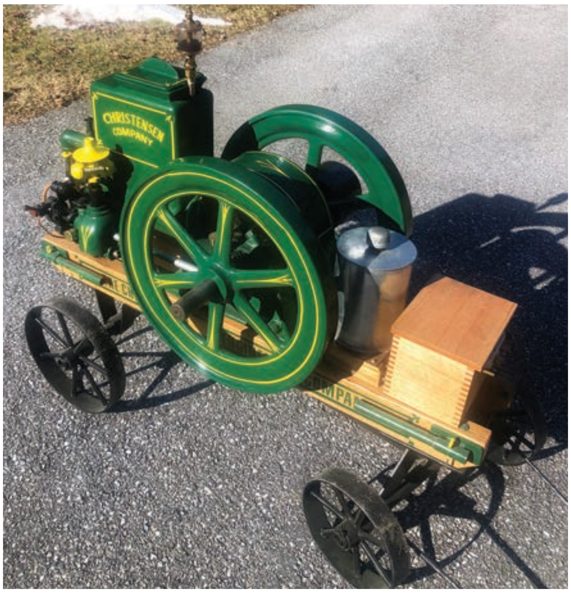
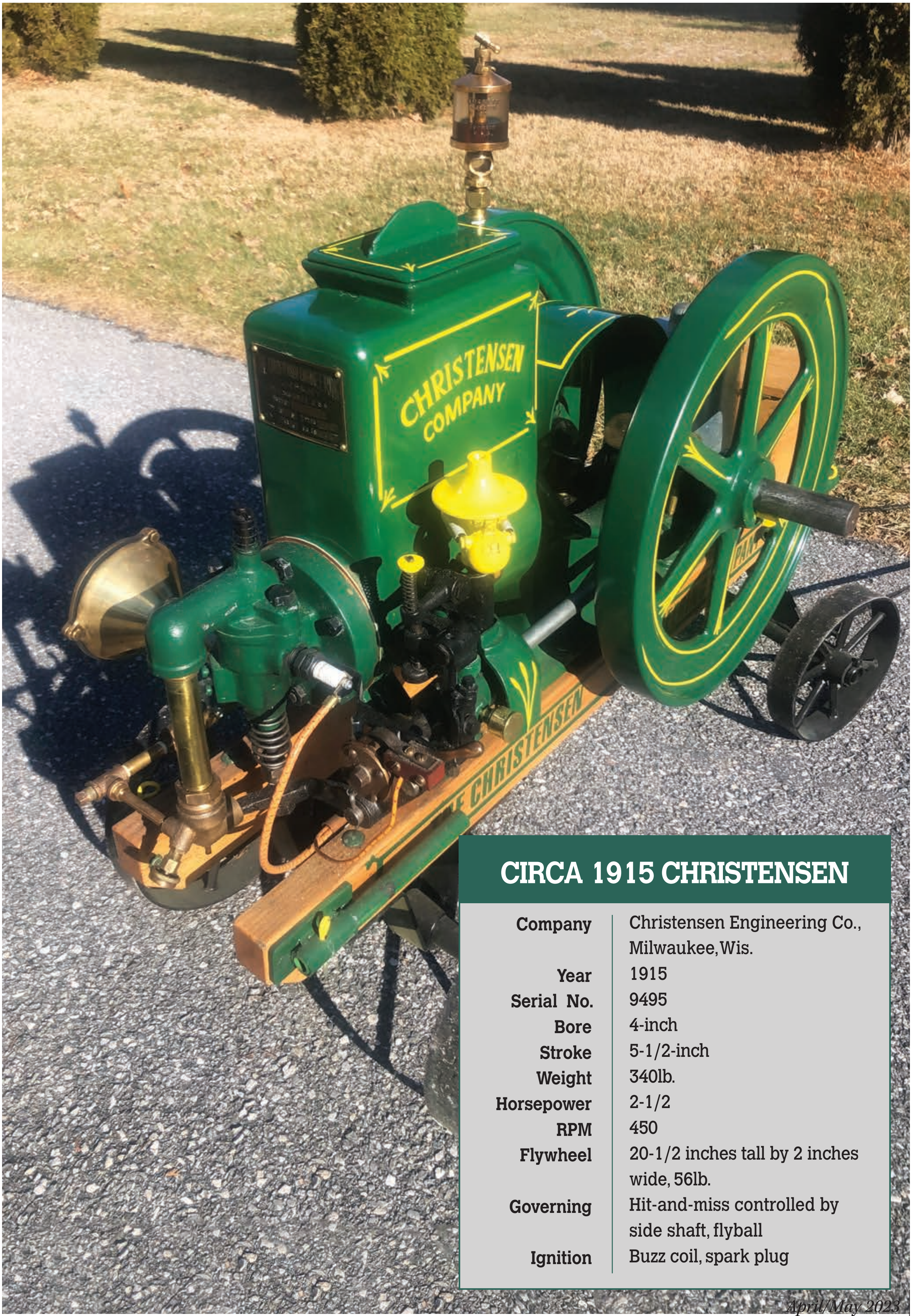


PHOTOS AND STORY BY KENNETH C. HENRY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CIRCA 1915 CHRISTENSEN

Company	Christensen Engineering Co., Milwaukee, Wis.
Year	1915
Serial No.	9495
Bore	4-inch
Stroke	5-1/2-inch
Weight	340lb.
Horsepower	2-1/2
RPM	450
Flywheel	20-1/2 inches tall by 2 inches wide, 56lb.
Governing	Hit-and-miss controlled by side shaft, flyball
Ignition	Buzz coil, spark plug

CPM will feature "Fractional HP Engines" in 2023. This trailer load of Briggs & Stratton engines seen in 2022 would be an appropriate display. The lower field of the museum that borders the creek always has wonderful displays of small engines.

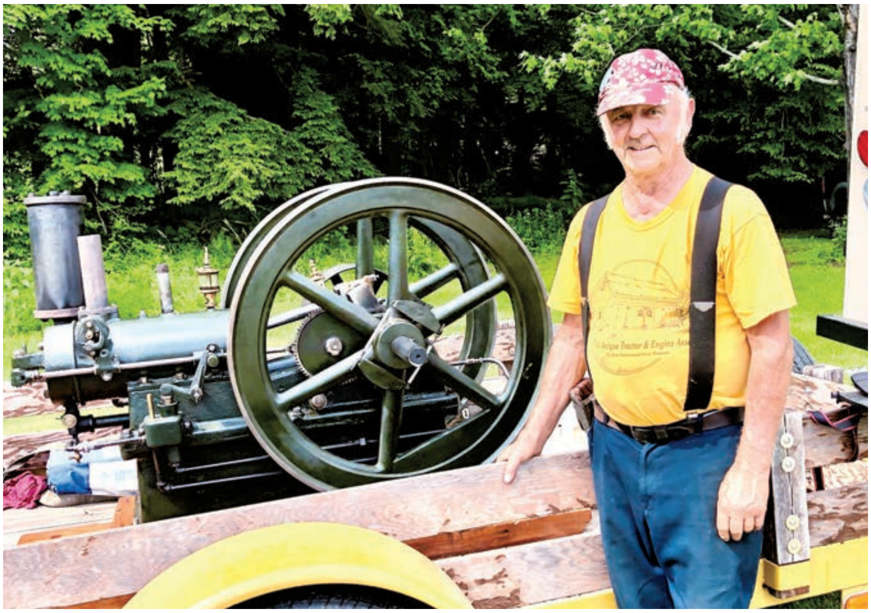
CPM's 2022 June Show and Swap

The Great Stover Expo

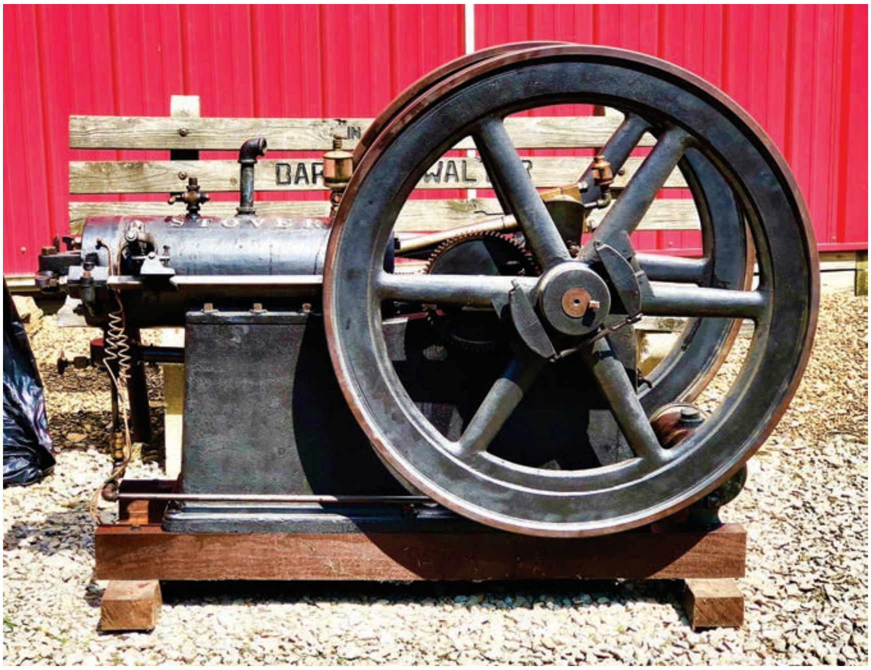
STORY AND PHOTOS BY DR. PAUL HARVEY

Four days of sunny and hot weather are unbelievable for a show in Coolspring, Pennsylvania. But it happened, to everyone's delight. No rain, no mud, no flood; just sunny skies for all. With the Covid-19 restrictions lifted, we again were able to visit with our Canadian and United Kingdom friends. The entire show had an atmosphere that was laid back, pleasant, and friendly. So many engines were running; both in the field and throughout the museum. It was a great time for all.

This year we featured Stover engines and equipment. I was amazed at what I saw and learned. There were more than 100 Stover engines on display and running. Thanks to everyone who participated!



I think the oldest Stover displayed is this 1905 model belonging to Phil St. Jean from Rhode Island. Recognizing what it was, he rescued the pieces from a scrap yard many years ago. Using some magic, he reconstructed this engine. Note it is running on hot tube.



Another fine old Stover. The early tank-cooled models exhibited fine lines that made an attractive machine. Note the large Stover name cast into the cylinder. Dan Stover wanted his name well-known.

As I traversed the grounds, I visited with many folks and took photos here and there. I have shared a few here and apologize for the many others omitted.

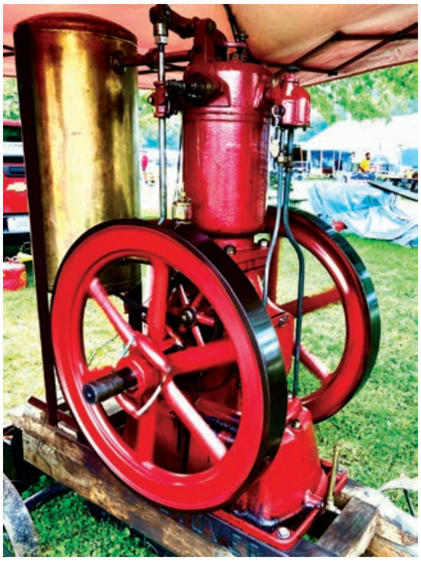
Many engines were restored and painted, and many were not. Some looked barn fresh and untouched in years. Doesn't matter to us; what does is that they were brought here to exhibit and complete our display. This enthusiasm from our friends is what makes CPM great!

We had great vendors selling all sorts of engine parts, as well as many other engines displayed and operating. There was a flea market with many new and useful items. The food court had delicious offerings and was always busy. And with the balmy weather, the Friday evening engine run was crowded with enthusiasts.

CPM's June Show was a tremendous event. I would like to take this opportunity to thank everyone who made this show. We have many volunteers during the show ensuring that all goes smoothly, many terrific exhibitors and vendors, and many unsung heroes who work countless weeks beforehand preparing for the event. It's a big job, but done so well. ⊛

Dr. Paul Harvey is the founder of Coolspring Power Museum and a regular contributor to ***Gas Engine Magazine****. Email him at engdoc8@gmail.com*

Check out videos of CPM's 2022 summer at ***gasenginemagazine.com/CPMJune***



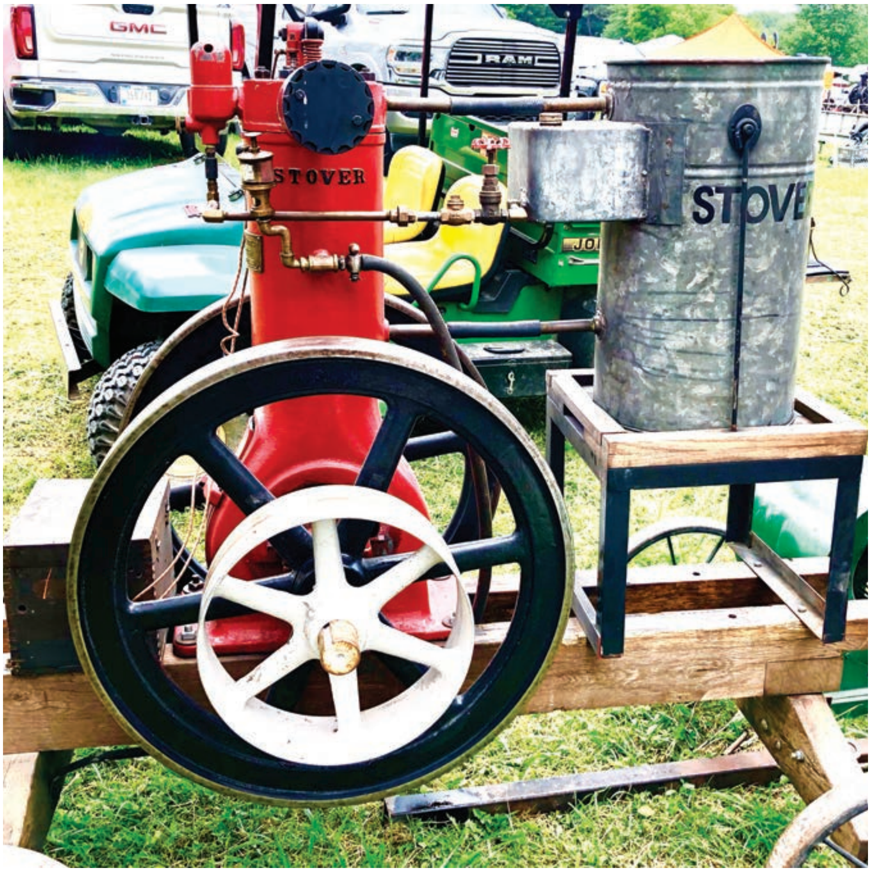
An interesting early vertical Stover. The firm only produced the uprights for a short time, finally settling on the farm engine.

COOLSPRING POWER MUSEUM SUMMER EVENTS

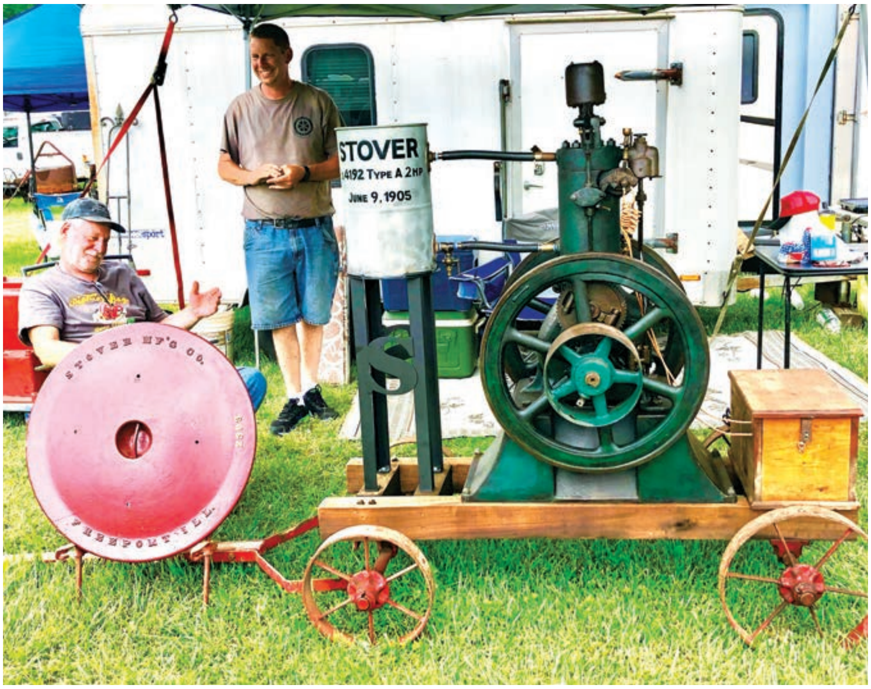
June 15–17, 2023
The 2023 Exposition and Flea Market will feature fractional horsepower engines. There are several varieties and types from numerous brands including: New Holland, Elgin, Maytag, Briggs and Stratton, among others.

July 15, 2023
CPM is hosting History Day from 9 a.m. to 4 p.m. Volunteers throughout the museum will explain when and where the engines were built and what they were used for. Many engines will be running throughout the day.

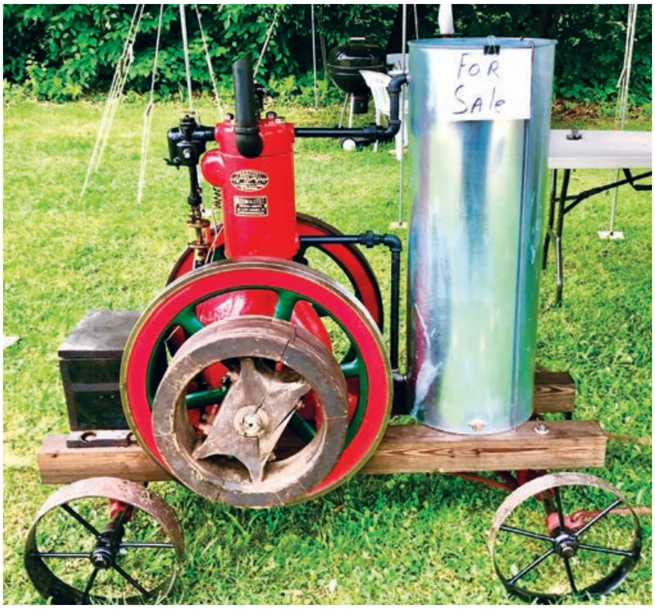
For more information, visit coolspringpowermuseum.org/events.htm



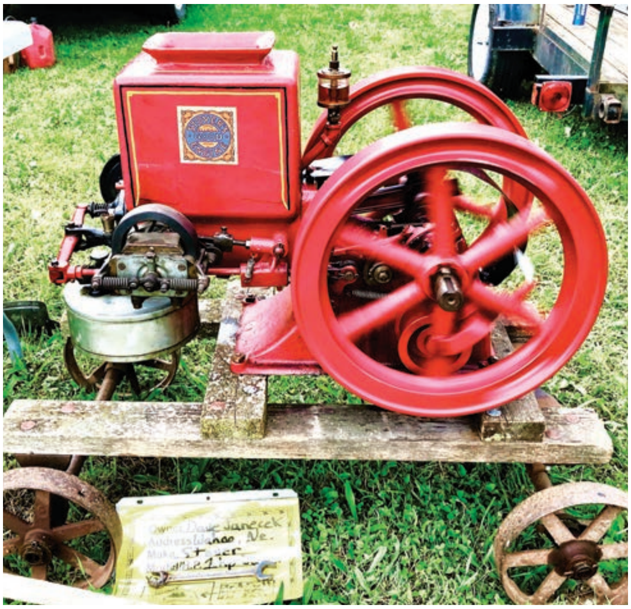
This early Stover uses a one-piece frame and cylinder. It must have been a challenge for the pattern maker and machine shop. Note the Stover name cast into the cylinder.



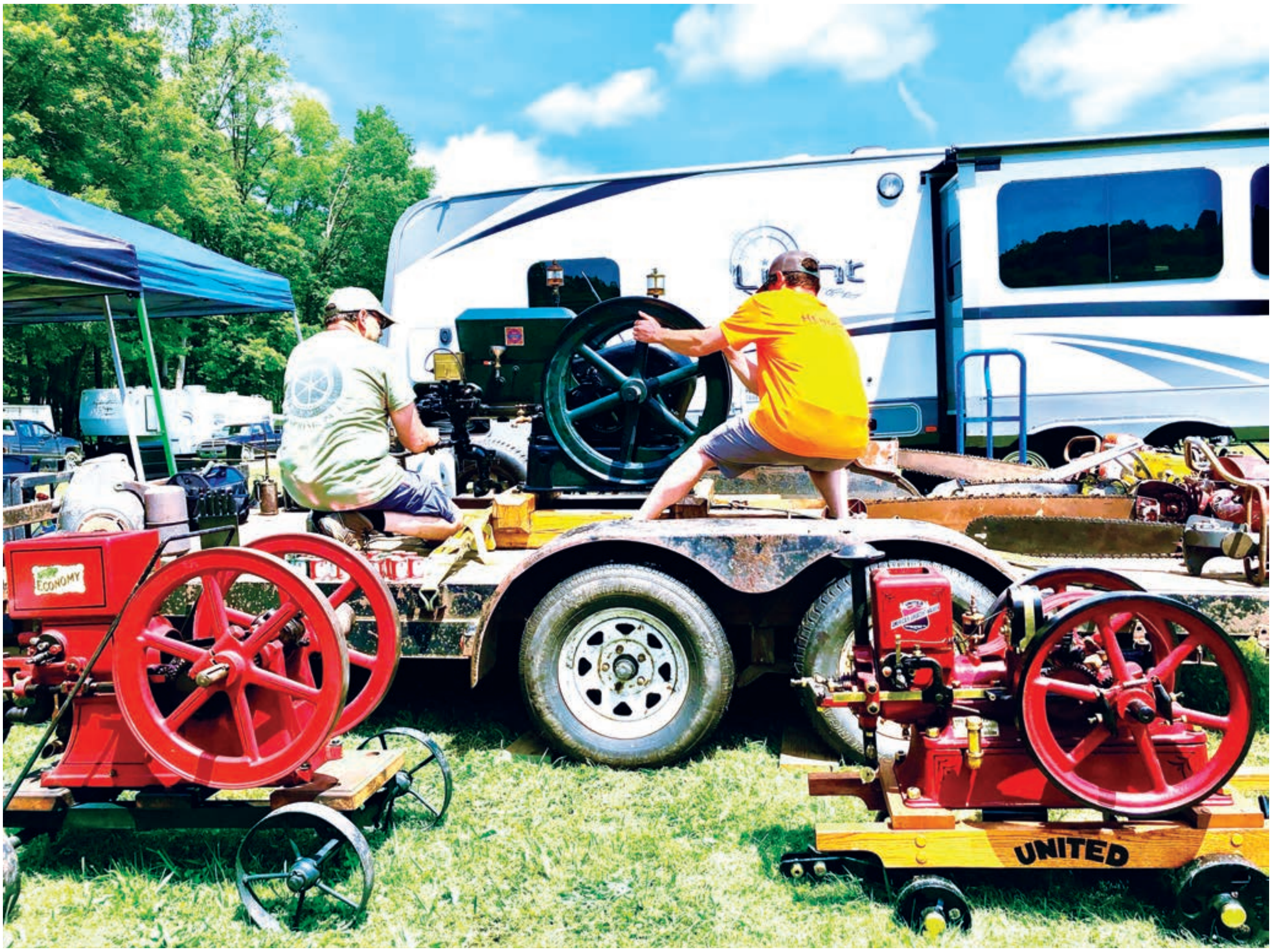
Another version of the vertical Stover. The early Stover engines that were on display ran well. Note the sump tank cover also displayed.



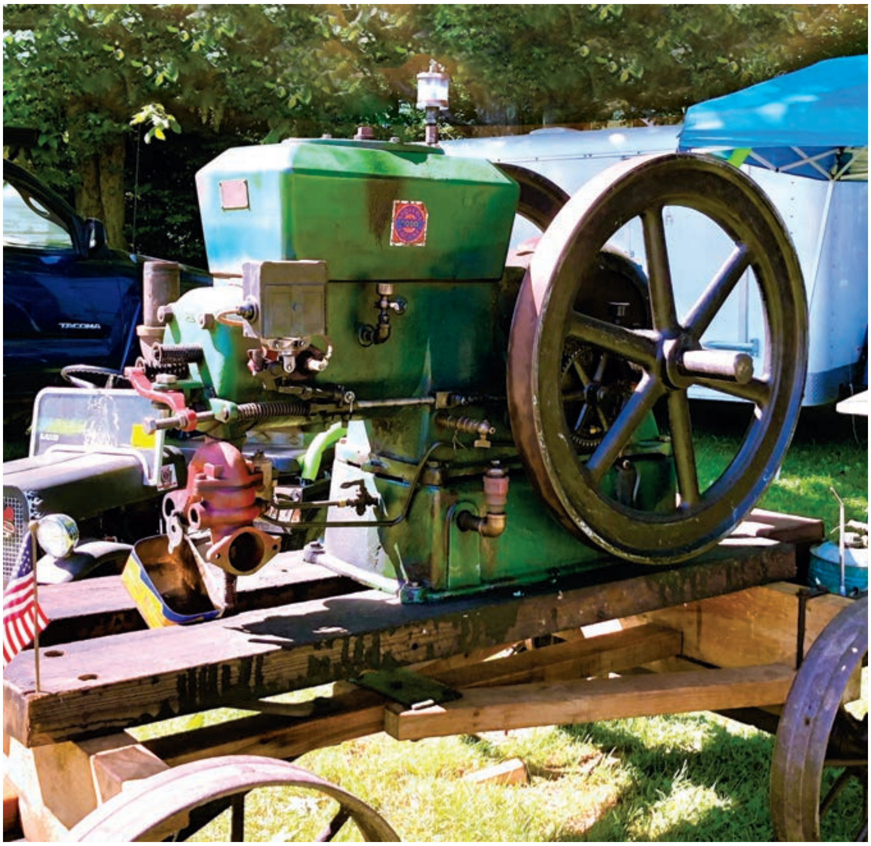
This red and green vertical Stover was up for grabs — for the right price.



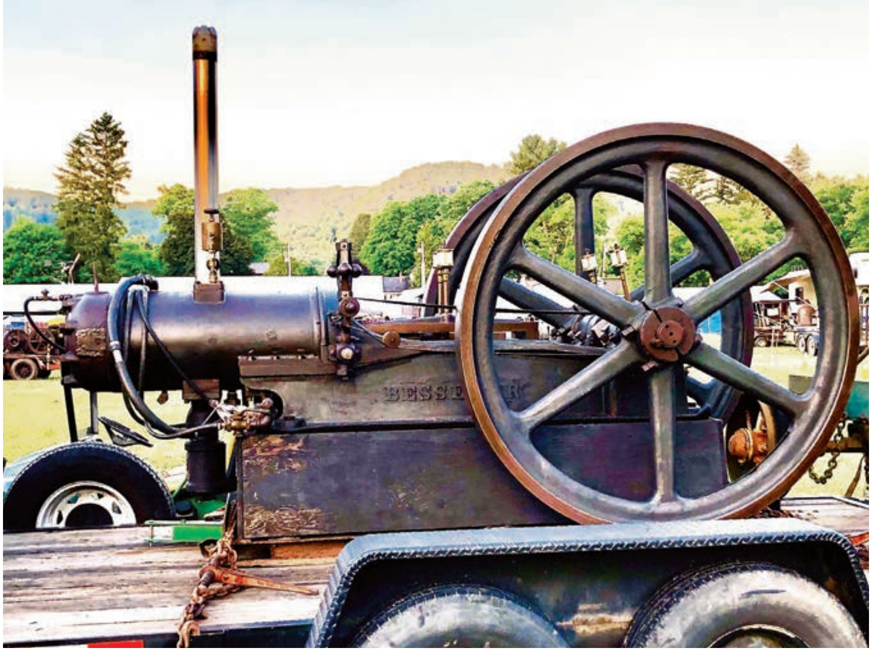
Note the "Stover's Good Engines" decal on this 1hp Junior owned by Dave Janecek.



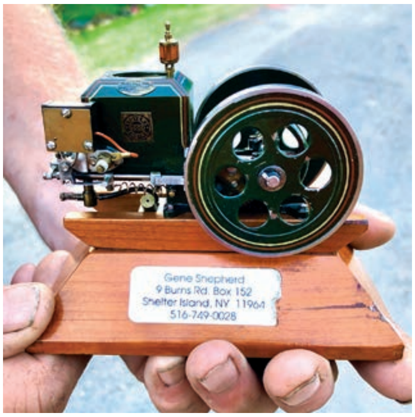
This action shot shows a gent pulling hard to start his beautifully restored engine. It started right off for him and ran well. This is just one example of the many folks who came to display and operate their Stovers. All their efforts made for an excellent event.



Another nice Stover that has the unusual dual-fuel mixer for either gas or gasoline.



This Bessemer was exhibited with a for-sale sign. Hmm, so let's look a bit closer. Wow, old-style frame without the oil troughs at the base. Interesting! Crosshead on center line and heavy wheels. Nice. Now note that governor. Yep, one of our members fell in love and now it resides here for all to watch run. Serial number 3984. That's low! My contact found the original record card that showed the engine was shipped April 24, 1901 to Horton Crary & Co. in Sheffield, Penn.

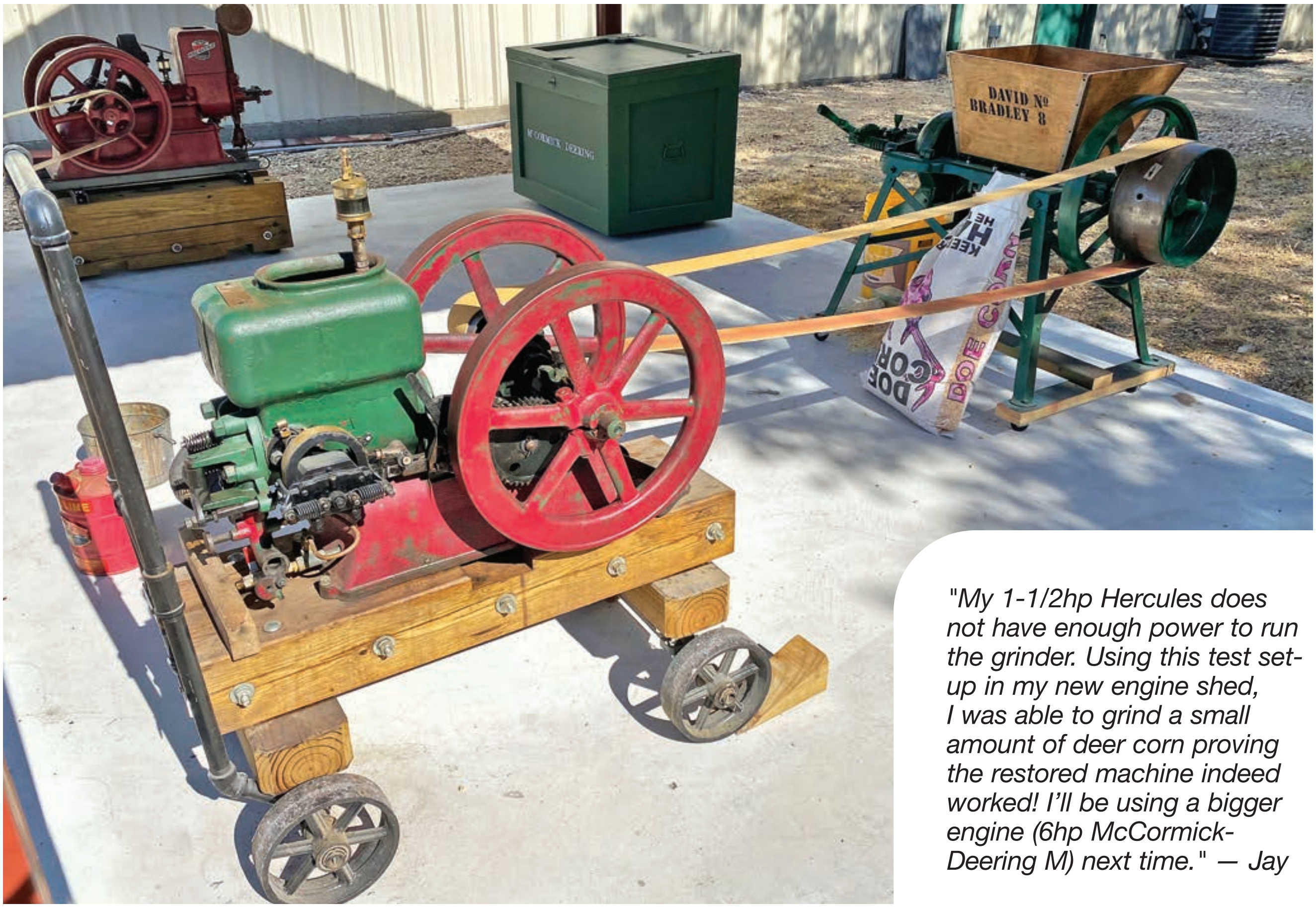


Gene Shepherd brought the smallest Stover, this fantastic model that actually runs.

Another highlight for me! The Evans that came from California finally ran, and ran well. This engine is serial number 547 and has some unique features: cooling water pump, counter balanced crankshaft, hit and miss governor, and brass timer for battery ignition. It is still a mystery how an engine built for the Butler, Penn., oil boom ever reached California! Here we see Tom Rapp putting his everything into starting it, as two great volunteers look on. I smiled all weekend!

From Rusted to
REVAMPED

Restoring a David Bradley No. 8 Corn and Cob Crusher and Feed Grinder

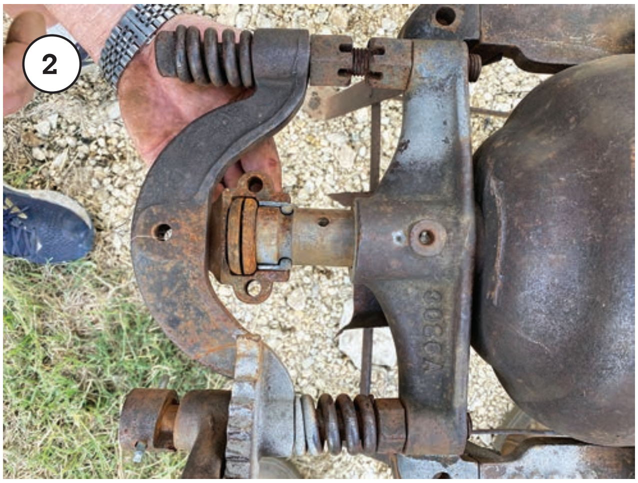


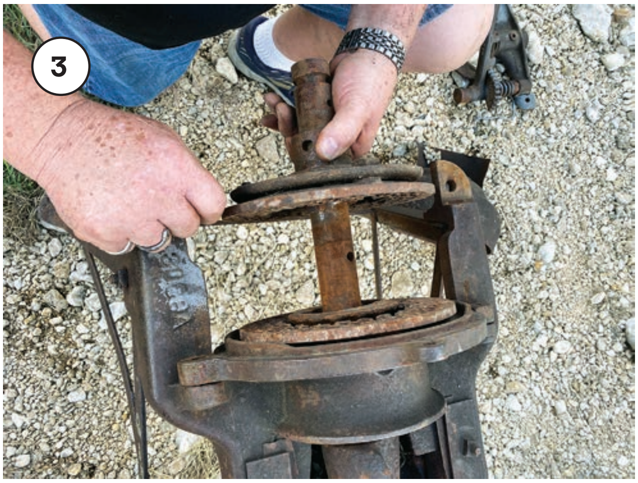
"My 1-1/2hp Hercules does not have enough power to run the grinder. Using this test set-up in my new engine shed, I was able to grind a small amount of deer corn proving the restored machine indeed worked! I'll be using a bigger engine (6hp McCormick-Deering M) next time." — Jay

In 1884, David Bradley purchased a plow company from his brother-in-law and soon partnered with Conrad Furst to create Furst and Bradley. Furst and Bradley eventually grew to occupy an entire city block at Fulton and Des Plaines streets in Chicago. Bradley and his sons purchased Furst's share of the business and the company was renamed David Bradley Plow Works. The company was relocated to North Kankakee (about 50 miles south of Chicago) in 1895. The town was later renamed Bradley, Illinois, in honor of the man and the company.

In 1910, the Bradley family sold the factory to Sears, Roebuck and Co., at which time it was renamed the David Bradley Manufacturing Works. The name was subsequently changed to David Bradley Manufacturing Co. and, in 1958, the company introduced the Garden Riding Tractor, and David Bradley became the largest manufacturer of garden riding tractors in the world. Sears also sold gasoline

STORY AND PHOTOS BY JAY MILLER





Figures 2-3: *These photos give some idea of the generally good condition of the machine. Most of the surfaces are rusted. The adjusting mechanism is shown here with the two grinding disks.*

engines manufactured by Briggs & Stratton under the David Bradley brand, replacing the previously used Economy name. In 1962, David Bradley Manufacturing Co. and the Newark Ohio Co. were merged into a single unit under the name Newark Ohio Co. The new company manufactured power lawn mowers, among other products.

In 1964, another merger took place and the Newark Ohio Co. was merged into the Geo. D. Roper Corp. with the plant in Newark, Ohio, continuing to manufacture outdoor power equipment, including riding and single power lawn mowers.

At the 2021 Texas Early Day Tractor and Engine Association show in Temple, Texas, I bought (very cheaply, I might add) what turned out to be a Bradley No. 8 Corn and Cob Crusher and Feed Grinder. It was pretty rusty and did not have a hopper. Unfortunately no one in our group thought to take a photo of it in "as found" condition.

When we unloaded the machine back at the ranch,

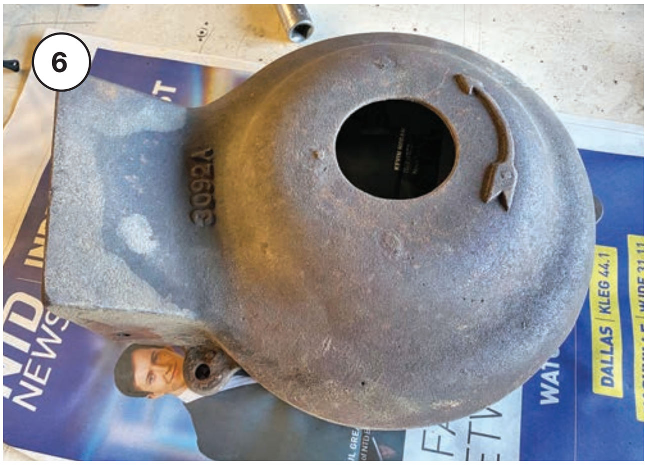
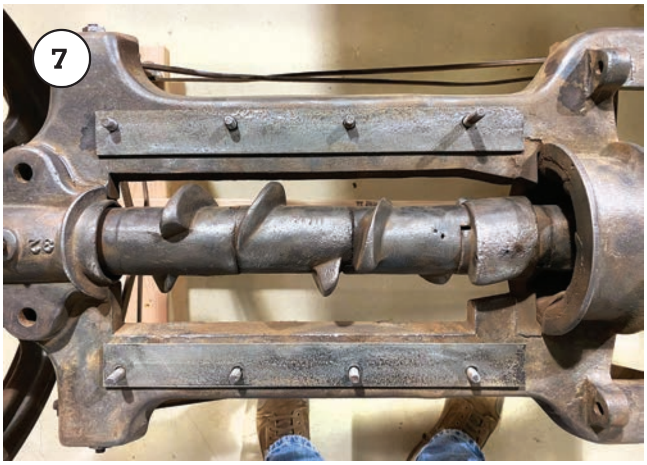
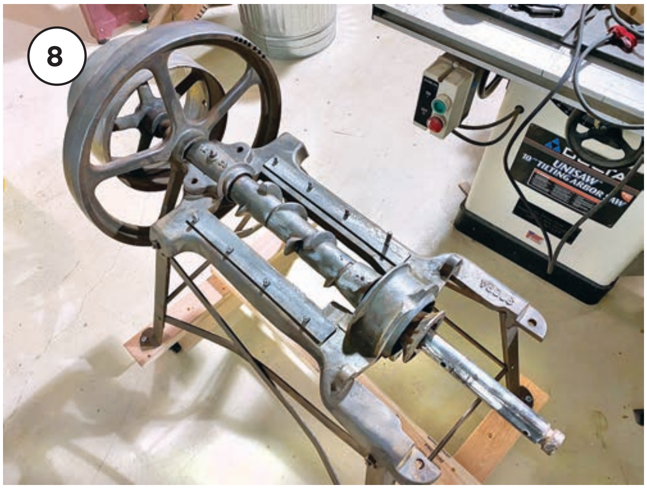
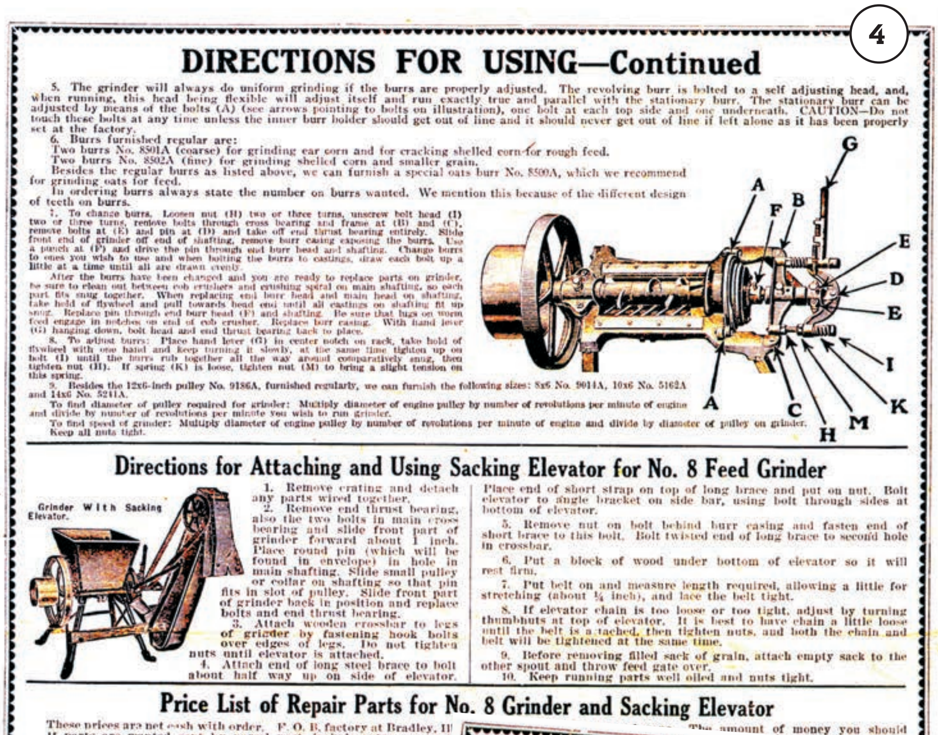


Figure 6: *The end bell was sandblasted in a blast cabinet to remove surface rust.*





Figures 7-8: *"The drive pulley and flywheel proved impossible to remove. I tried soaking the whole end in EvapoRust and heated the joints with a large torch — nothing would budge. So I used some EvapoRust here and there and a thorough going over with several sizes of wire brushes using an air tool. This method worked well. The Scotchbrite pads soaked in parts solvent worked too." — Jay*



4

DIRECTIONS FOR USING—Continued

5. The grinder will always do uniform grinding if the burrs are properly adjusted. The revolving burr is bolted to a self adjusting head, and, when running, this head being flexible will adjust itself and run exactly true and parallel with the stationary burr. The stationary burr can be adjusted by means of the bolts (A) (see arrows pointing to bolts on illustration), one bolt at each top side and one underneath. CAUTION—Do not touch these bolts at any time unless the inner burr holder should get out of line and it should never get out of line if left alone as it has been properly set at the factory.

6. Burrs furnished regular are:

Two burrs No. 8501A (coarse) for grinding ear corn and for cracking shelled corn for rough feed.

Two burrs No. 8502A (fine) for grinding shelled corn and smaller grain.

Besides the regular burrs as listed above, we can furnish a special oats burr No. 8500A, which we recommend for grinding oats for feed.

In ordering burrs always state the number on burrs wanted. We mention this because of the different design of teeth on burrs.

7. To change burrs. Loosen nut (H) two or three turns, unscrew bolt head (I) two or three turns, remove bolts through cross bearing and frame at (B) and (C), remove bolts at (E) and pin at (D) and take off end thrust bearing entirely. Slide front end of grinder off end of shafting, remove burr casing exposing the burrs. Use a punch at (F) and drive the pin through end burr head and shafting. Change burrs to ones you wish to use and when bolting the burrs to castings, draw each bolt up a little at a time until all are drawn evenly.

After the burrs have been changed and you are ready to replace parts on grinder, be sure to clean out between cob crushers and crushing spiral on main shafting, so each part fits snug together. When replacing end burr head and main head on shafting, take hold of flywheel and pull towards head end until all castings on shafting fit up snug. Replace pin through end burr head (F) and shafting. Be sure that lugs on worm feed engage in notches on end of cob crusher. Replace burr casing. With hand lever (G) hanging down, bolt head and end thrust bearing back to place.

8. To adjust burrs: Place hand lever (G) in center notch on rack, take hold of flywheel with one hand and keep turning it slowly, at the same time tighten up on bolt (I) until the burrs rub together all the way around comparatively snug, then tighten nut (H). If spring (K) is loose, tighten nut (M) to bring a slight tension on this spring.

9. Besides the 12x6-inch pulley No. 9186A, furnished regularly, we can furnish the following sizes: 8x6 No. 9014A, 10x6 No. 5162A and 14x6 No. 5241A.

To find diameter of pulley required for grinder: Multiply diameter of engine pulley by number of revolutions per minute of engine and divide by number of revolutions per minute you wish to run grinder.

To find speed of grinder: Multiply diameter of engine pulley by number of revolutions per minute of engine and divide by diameter of pulley on grinder.

Keep all nuts tight.

Directions for Attaching and Using Sacking Elevator for No. 8 Feed Grinder

Grinder With Sacking Elevator.

1. Remove crating and detach any parts wired together.

2. Remove end thrust bearing, also the two bolts in main cross bearing and slide front part of grinder forward about 1 inch. Place round pin (which will be found in envelope) in hole in main shafting. Slide small pulley or collar on shafting so that pin fits in slot of pulley. Slide front part of grinder back in position and replace bolts and end thrust bearing.

3. Attach wooden crossbar to legs of grinder by fastening hook bolts over edges of legs. Do not tighten nuts until elevator is attached.

4. Attach end of long steel brace to bolt about half way up on side of elevator. Place end of short strap on top of long brace and put on nut. Bolt elevator to angle bracket on side bar, using bolt through sides at bottom of elevator.

5. Remove nut on bolt behind burr casing and fasten end of short brace to this bolt. Bolt twisted end of long brace to second hole in crossbar.

6. Put a block of wood under bottom of elevator so it will rest firm.

7. Put belt on and measure length required, allowing a little for stretching (about ¼ inch), and lace the belt tight.

8. If elevator chain is too loose or too tight, adjust by turning thumbnuts at top of elevator. It is best to have chain a little loose until the belt is attached, then tighten nuts, and both the chain and belt will be tightened at the same time.

9. Before removing filled sack of grain, attach empty sack to the other spout and throw feed gate over.

10. Keep running parts well oiled and nuts tight.

Price List of Repair Parts for No. 8 Grinder and Sacking Elevator

These prices are net cash with order. F. O. B. factory at Bradley, Il The amount of money you should of your

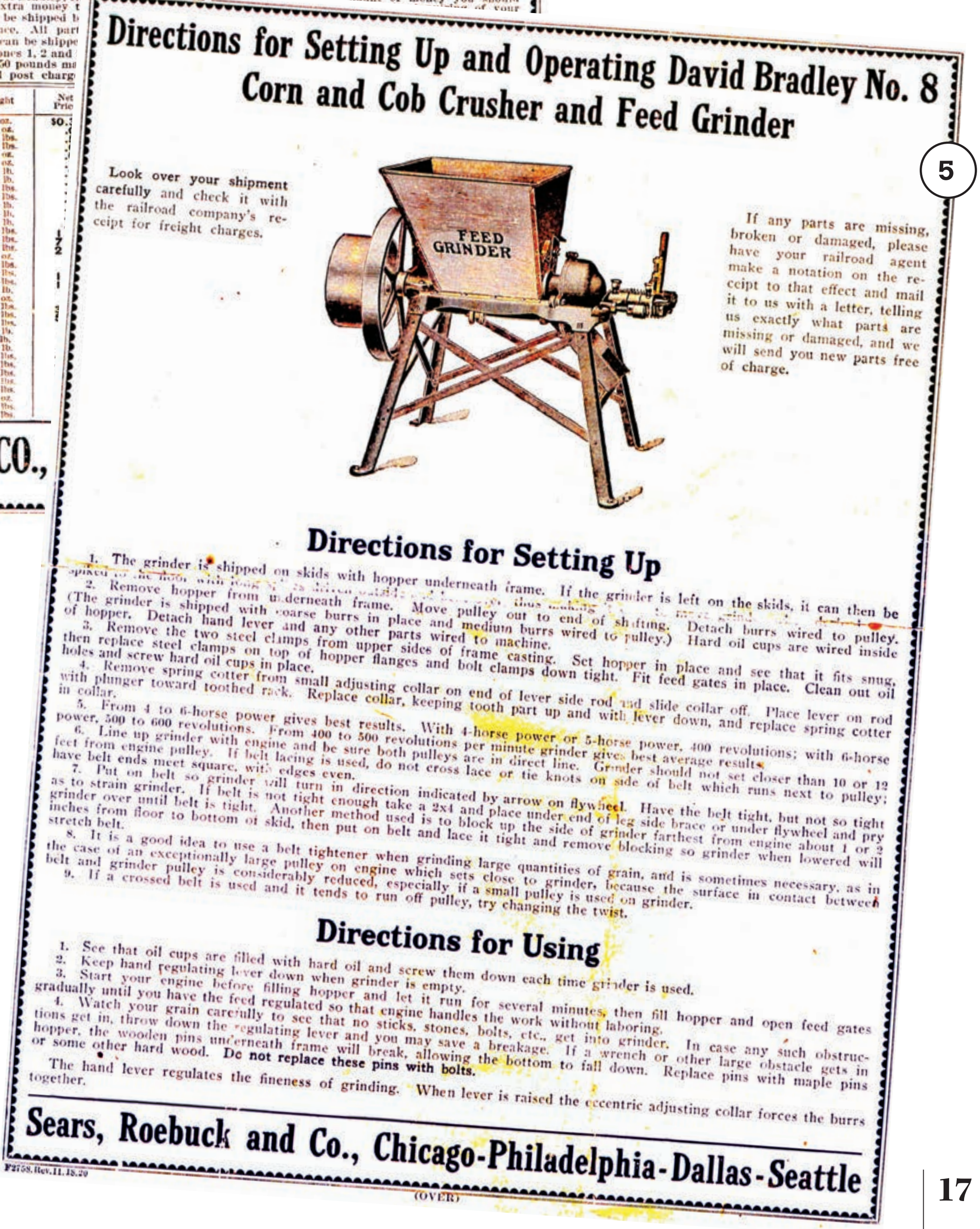
If parts are wanted sent by parcel post, include extra money t cover postage. All parts weighing 4 ounces or less can be shipped b parcel post at 1 cent an ounce, regardless of distance. All part weighing over 4 ounces, up to and including 70 pounds, can be shippe by parcel post at pound rates in the local zone and in zones 1, 2 and In all other zones parcels weighing up to and including 50 pounds ma be shipped by parcel post. Be sure to include parcel post charg

Number Appearing on Part	Name of Part	Weight	Net Pric
0	Hard Oil Cup	3 oz.	$0.
91A	Washer for Cut-Off Slides	2 oz.	
1157A	Worm Section	3 lbs.	
1185A	Worm Section	3½ lbs.	
1539U	Spring on Lever Plunger	2 oz.	
1604U	Spring on Side Rod	7 oz.	
2420A	Wrench	1 lb.	
2764A	Strap for Cut-Off Slides	½ lb.	
2801A	Feed Adjusting Lever	2½ lbs.	
2807A	Feed Adjusting Ratchet	3½ lbs.	
2809A	Side Rod	1 lb.	
2867A	Cut-Off Slide, right side	¾ lb.	
2898A	Cut-Off Slide, left side	¾ lb.	
3086A	Cross Frame Bearing	5 lbs.	
3089A	Main Frame	42 lbs.	
3092A	Burr Casing	11¾ lbs.	
3103A	Drilled Pin for Adjusting Head	2 oz.	
3170A	Crushing Spiral	3¾ lbs.	
3196A	Head for Stationary Burr	7¼ lbs.	
3271A	Bearing Boxing, flywheel end	5 lbs.	
3274A	End Thrust Ball Bearing	½ lb.	
3918A	Drilled Pin in End Thrust Bearing Box	2 oz.	
5162A	Pulley, 10-inch by 6-inch face	20 lbs.	
5241A	Pulley, 14-inch by 6-inch face	28 lbs.	
6572A	Clamp for Burr	2¾ lbs.	
8490A	End Thrust Bearing Box, lower half	1 lb.	
393E	End Thrust Bearing Box, upper half	1 lb.	
8493A	Collar for Lever	½ lb.	
8500A	Pair Burrs, oats or fine meal (see our Big Catalog)	7 lbs.	
8501A	Pair Burrs, coarse (see our Big Catalog)	6½ lbs.	
8502A	Pair Burrs, medium (see our Big Catalog)	7 lbs.	
8503A	Large Crusher	3 lbs.	
8615A	Flywheel	47 lbs.	
8814A	Plunger for Lever	3 oz.	
9014A	Pulley, 8-inch by 6-inch face	15 lbs.	
9186A	Pulley, 12-inch by 6-inch face	24 lbs.	

SEARS, ROEBUCK AND CO.,

F2758. Rev. 11. 18. 20

> "Start your engine before filling [the] hopper and let it run for several minutes, then fill [the] hopper and open feed gates gradually until you have the feed regulated so that [the] engine handles the work without laboring."
>
> — Sears, Roebuck and Co. directions (at left)



5

Directions for Setting Up and Operating David Bradley No. 8 Corn and Cob Crusher and Feed Grinder

Look over your shipment carefully and check it with the railroad company's receipt for freight charges.

If any parts are missing, broken or damaged, please have your railroad agent make a notation on the receipt to that effect and mail it to us with a letter, telling us exactly what parts are missing or damaged, and we will send you new parts free of charge.

Directions for Setting Up

1. The grinder is shipped on skids with hopper underneath frame. If the grinder is left on the skids, it can then be spiked to the floor with long [illegible] driven outside [illegible] thus making [illegible]

2. Remove hopper from underneath frame. Move pulley out to end of shafting. Detach burrs wired to pulley. (The grinder is shipped with coarse burrs in place and medium burrs wired to pulley.) Hard oil cups are wired inside of hopper. Detach hand lever and any other parts wired to machine.

3. Remove the two steel clamps from upper sides of frame casting. Set hopper in place and see that it fits snug, then replace steel clamps on top of hopper flanges and bolt clamps down tight. Fit feed gates in place. Clean out oil holes and screw hard oil cups in place.

4. Remove spring cotter from small adjusting collar on end of lever side rod and slide collar off. Place lever on rod with plunger toward toothed rack. Replace collar, keeping tooth part up and with lever down, and replace spring cotter in collar.

5. From 4 to 6-horse power gives best results. With 4-horse power or 5-horse power, 400 revolutions; with 6-horse power, 500 to 600 revolutions. From 400 to 500 revolutions per minute grinder gives best average results.

6. Line up grinder with engine and be sure both pulleys are in direct line. Grinder should not set closer than 10 or 12 feet from engine pulley. If belt lacing is used, do not cross lace or tie knots on side of belt which runs next to pulley; have belt ends meet square, with edges even.

7. Put on belt so grinder will turn in direction indicated by arrow on flywheel. Have the belt tight, but not so tight as to strain grinder. If belt is not tight enough take a 2x4 and place under end of leg side brace or under flywheel and pry grinder over until belt is tight. Another method used is to block up the side of grinder farthest from engine about 1 or 2 inches from floor to bottom of skid, then put on belt and lace it tight and remove blocking so grinder when lowered will stretch belt.

8. It is a good idea to use a belt tightener when grinding large quantities of grain, and is sometimes necessary, as in the case of an exceptionally large pulley on engine which sets close to grinder, because the surface in contact between belt and grinder pulley is considerably reduced, especially if a small pulley is used on grinder.

9. If a crossed belt is used and it tends to run off pulley, try changing the twist.

Directions for Using

1. See that oil cups are filled with hard oil and screw them down each time grinder is used.

2. Keep hand regulating lever down when grinder is empty.

3. Start your engine before filling hopper and let it run for several minutes, then fill hopper and open feed gates gradually until you have the feed regulated so that engine handles the work without laboring.

4. Watch your grain carefully to see that no sticks, stones, bolts, etc., get into grinder. In case any such obstructions get in, throw down the regulating lever and you may save a breakage. If a wrench or other large obstacle gets in hopper, the wooden pins underneath frame will break, allowing the bottom to fall down. Replace pins with maple pins or some other hard wood. **Do not replace these pins with bolts.**

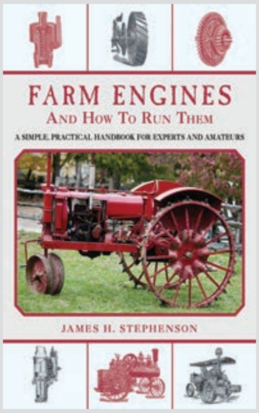
The hand lever regulates the fineness of grinding. When lever is raised the eccentric adjusting collar forces the burrs together.

Sears, Roebuck and Co., Chicago-Philadelphia-Dallas-Seattle

F2758. Rev. 11. 18. 20

(OVER)

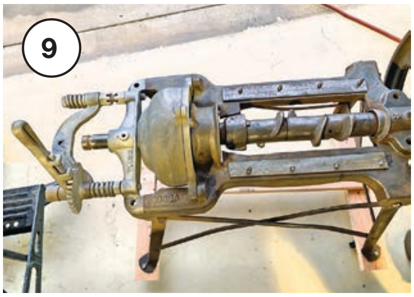
***Figures 4-5:** About the only surviving document for the corn and cob crusher located by the author on eBay. It was sold by Sears and Roebuck under their brand name — a common practice for Sears. The paper was invaluable to the engine's restoration.*



Farm Engines and How to Run Them

A Simple, Practical Handbook for Experts and Amateurs

Originally published in the early 1900s, this classic, comprehensive handbook was referred to by young engineers as they prepared for their licensing examinations. In addition to containing several hundred questions and answers that were given as part of many exams, *Farm Engines and How to Run Them* fully describes every part of a farm engine and boiler, giving complete directions for the safe and economical management of both. The book abounds with artwork and cutaway illustrations showing the different parts of a boiler and engine, and nearly each make of traction engine. *Farm Engines and How to Run Them* will appeal to everyone from farm and vehicle enthusiasts to students of industrial technology and agricultural history. This title is available at Store.GasEngineMagazine.com or by calling 800-888-9098. Mention promo code MGEPANZ5. Item #8263.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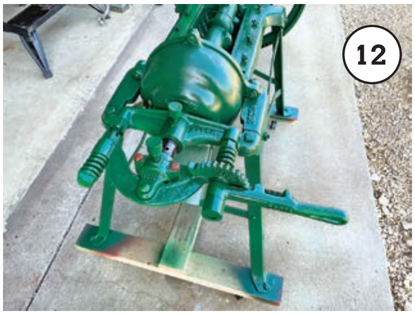
10

Figures 9-10: *Test fitting the components together to be sure everything worked okay. The stand X-braces were made of a thinner material and heavily rusted. Fortunately, no serious damage was found. A cart was created from some 2x4s and four casters to make moving it around the shop easier.*

11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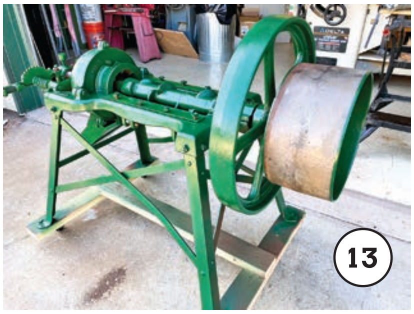
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Figures 11-13: *"All individual components and the large assembly were sprayed with Rustoleum Red Metal Primer. I baked the parts outside for two days before applying the finish coat of Rustoleum Dark Hunter Green. I 'sun-baked' the color and proceeded to assembly." — Jay*

we did take a couple of photos of the business end while we tried to figure out how it went together. I located the only piece of reference material available on eBay, at a rather steep price. Turned out to be a scan, printed in color and spiral bound in a cover. Regardless, it was invaluable. I did find a couple of photos on the internet and one or two brief videos.

We started taking the machine apart and began the rust removal process. Most of the parts were in good shape, just rusty. No matter what we tried, we were unable to get the drive pulley and flywheel off the main shaft. It turned freely so a decision was made to proceed anyway.

We used a combination of sandblasting, EvapoRust soak, Scotchbrite pads, and wire brushes to clean up the parts.

While pretty expensive, the EvapoRust worked well. I placed all the bolts, nuts, and other small hardware in an ultrasonic cleaner filled with EvapoRust, and it did a great job.

The cleaned up parts were sprayed with Rustoleum red primer and given a finish coat of Rustoleum Dark Hunter Green.

Sheet metal skills and equipment are not at the top of my skill set. So, I decided to make the hopper out of 1/2-inch plywood. Using my CNC router, I cut out the compound angles and engraved the "David Bradley No. 8." The pieces were glued and nailed together, and I bent and attached several strips of sheet metal for the corners.

The feed gates were cut and bent from sheet metal as well. The only

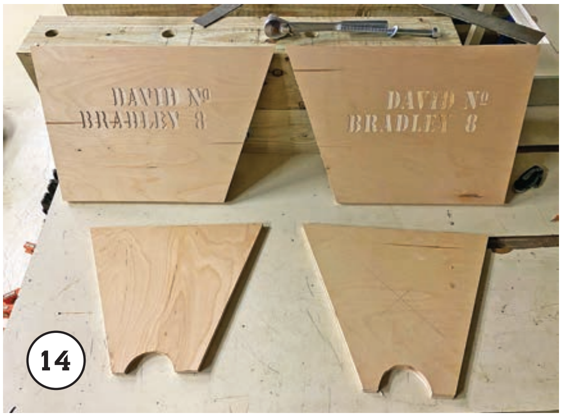


Figure 14: *"The parts for the hopper were cut from 1/2-inch birch plywood on my CNC router. I first made a cardboard mock-up to help figure the angles. I took license by using the CNC machine to rout the letters." — Jay*

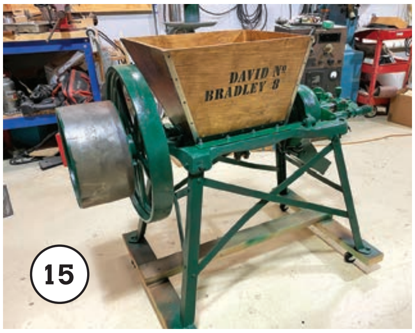
Watch a video of the David Bradley No. 8 powered by Jay's fully restored 6hp McCormick Type M at gasenginemagazine.com/DavidBradley

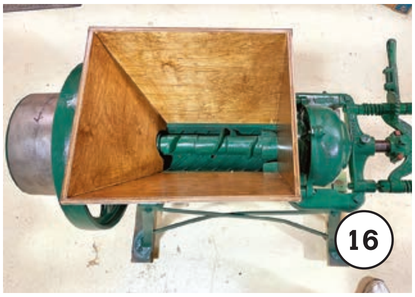
guide I had to make them was a low resolution YouTube video I found. By running the video back and forth, I was able to figure out how parts regulate the flow of material to the grinding burrs. I did fabricate the output spout from sheet metal.

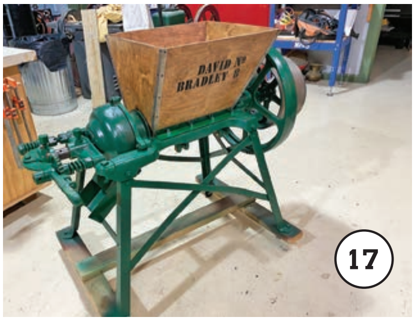
I was finally able to get the machine outside in my new machinery shed and hook it up to a 1-1/2hp Hercules engine with a 4-inch flat belt. The instruction sheet recommends a 4- to 5hp engine, so the little Hercules was severely underpowered. I did manage to grind a small amount of deer corn to prove the operation.

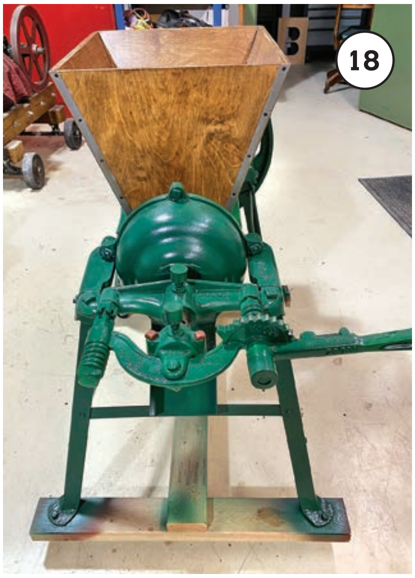
Once I finished the restoration of my 6hp McCormick-Deering M, I used it to power the No. 8 and give the chickens a treat!

***Jay Miller** has 40 years' experience writing for hobby magazines in model and prototype railroading and amateur radio. He authored two books on Collins Radio equipment and edited the* Santa Fe Modeler *magazine for 10 years. He is a professional photographer, radio engineer and accomplished machinist. Jay resides on a ranch near Crawford, Texas, and is semi-retired. Contact him at **jay@kk5im.com** or visit his YouTube channel **@Radiotexas**.*









Figures 15-18: *Views from all four sides of the completed restoration (except feed gates). The hopper was glued and nailed together. It was stained, given three coats of acrylic polyurethane, and then the engraved letters were painted with flat black. The corners of the hopper were made from thin galvanized stock, bent and drilled for holes. They received a light acid etch to age them a bit.*

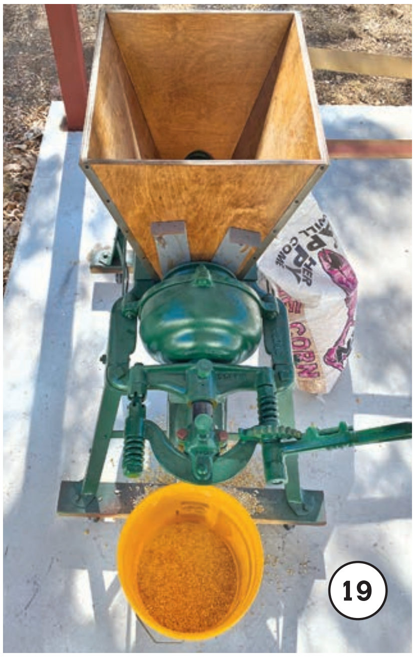
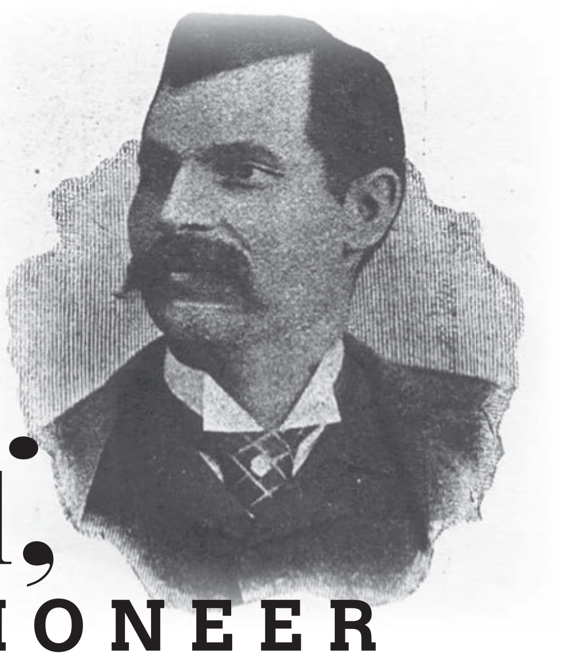


Figure 19: *Note the two feed gates on the hopper behind the grinding bell. Figuring out the dimensions and exactly what purpose they play was the most complicated part of the project. They are made of sheet metal and rotate back and forth to regulate the amount of corn the auger/crusher feeds into the grinder. Anyone interested in a drawing of the parts may contact the author via email. Note the small amount of ground "chicken feed" in the 5-gallon bucket.*



Tracing the Career of Frank M. Underwood,

GAS ENGINE PIONEER

Underwood's Post-Lambert Patents

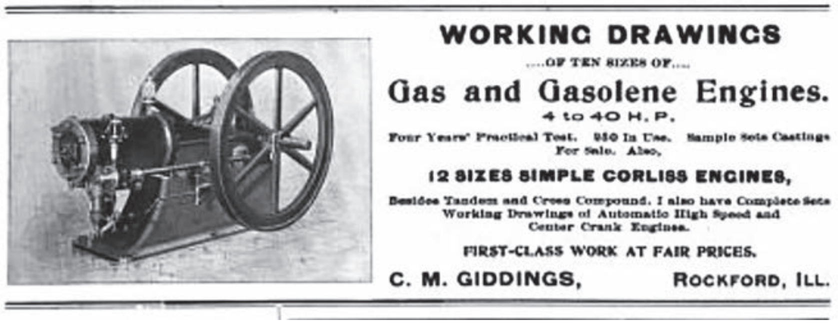
— The eighth and final part of an ongoing series.

In the previous article, I raised the question whether there could be a direct connection between Frank M. Underwood (who built engines in several locations around northwest Ohio) and the Underwood Machine Co. of Minneapolis, Minnesota. My answer was "no direct connection." But could there be an indirect and coincidental connection between the two Underwoods? To approach that question, let's look at the career of C.M. Giddings.

C.M. Giddings Connection?

"Mr. Giddings started this business at Rockford, Illinois, some four years ago and reports a steadily increasing business until now he requires the help of five assistants. Mr. Giddings, after taking a course in mechanical engineering at Cornell University, at Ithica, New York, first designed the portable engine now being built by John Lang, of that city, then for two years was connected with the Waterous Governor Co., of Boston, as expert and traveling salesman, then leaving the road, he married and settled down at Massillon, Ohio, as mechanical engineer for Russell & Co. He was with this firm for seven years, the last four of which he had exclusive charge of the engineering department, which position he resigned to go to Sioux City, Iowa, with the Sioux City Engine Works, and for the last four years of the seven years with that concern, he held the position of president and general manager … Many readers will remember the 24x48 Corliss engine of Mr. Giddings' design, which was exhibited at the World's Fair in the annex of the machinery building, near the Pratt & Whitney Exhibit, and which was known as the White Corliss …

"This month we show the design of a standard 4-cycle gas engine with electric ignition and throttling regulation, which engine has been built during the past four years from 2 to 40hp, to the number of about 300, and has never, we are informed, failed to make a clean record. These engines have been built from the drawings furnished by Mr. Giddings by four well-known firms in different parts of the country, who are putting them



WORKING DRAWINGS

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Gas and Gasolene Engines.

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Four Years' Practical Test. 950 In Use. Sample Sets Castings For Sale. Also,

12 SIZES SIMPLE CORLISS ENGINES,

Besides Tandem and Cross Compound. I also have Complete Sets Working Drawings of Automatic High Speed and Center Crank Engines.

FIRST-CLASS WORK AT FAIR PRICES.

C. M. GIDDINGS, ROCKFORD, ILL.

***Figure 1:** An engine designed by C.M. Giddings, as seen in* Modern Machinery: Devoted to Machinery and Machine Tools, *January 1898.*

STORY BY WILL CUMMINGS

on the market successfully. The design speaks for itself, and was originally made and brought out by one of the best gas engine experts and builders in Ohio, who, after being thrown out of business by the financial troubles of the concern he was with, was secured by Mr. Giddings to embody his practical experience in this design and to superintend the making of drawings for 10 different sizes of engines up to and including 40hp." *Modern Machinery: Devoted to Machinery and Machine Tools*, January 1898.

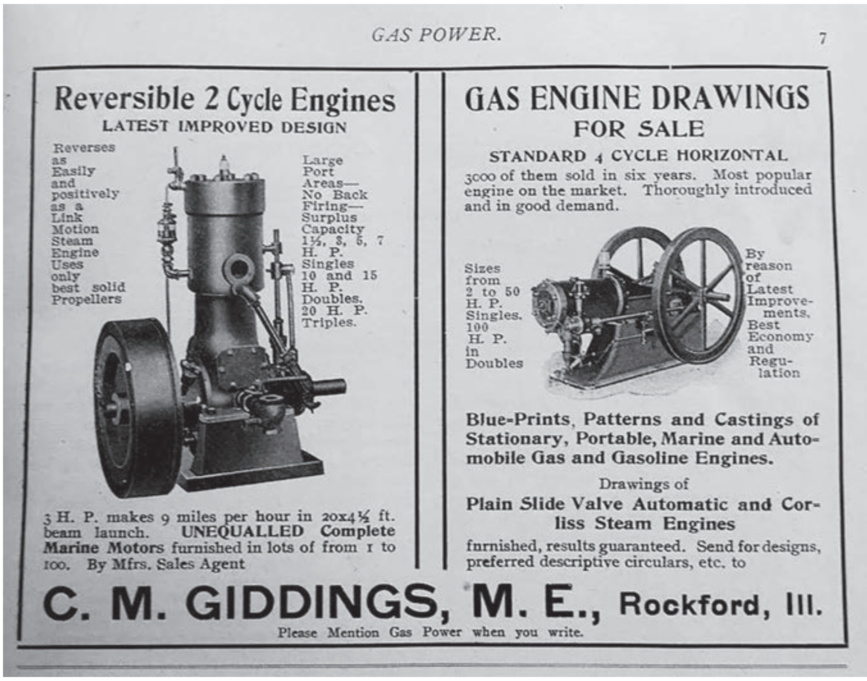
Could the "best gas engine expert and builder in Ohio" that the C.M. Giddings' article refers to be F.M. Underwood? Your guess is as good as mine, but the possibility is strong.

In looking at the C.M. Giddings 4-cycle engine photo (Figure 1) we see features common with the Underwood design: tank-cooled engine, cylinder bolted to the bedplate, layshaft with a vertical-plunger coolant pump, bevel-gear-driven vertical-shaft flyball governor, similar placement and position of cylinder head studs, igniter centered in the cylinder head actuated by the layshaft, and exhaust valve on the opposite side operated by an under-the cylinder rocker.

On the other hand, there were several engine builders of this time period located in Ohio and northern Indiana that offered models that were similar. Probably as soon as a new design was built by one manufacturer, it influenced future designs of other manufacturers.

The Lambert/ Underwood Legacy

In the first article of this series, I announced my intention to maximize historical evidence and minimize my educated guesses. However, in this last article we will look at other contemporary engine manufacturers and try to make some educated guesses about which engine designs were influenced by F.M. Underwood (drawing on the common Lambert/Buckeye legacy), and which simply developed independently of the Lambert/Buckeye/Underwood influence.



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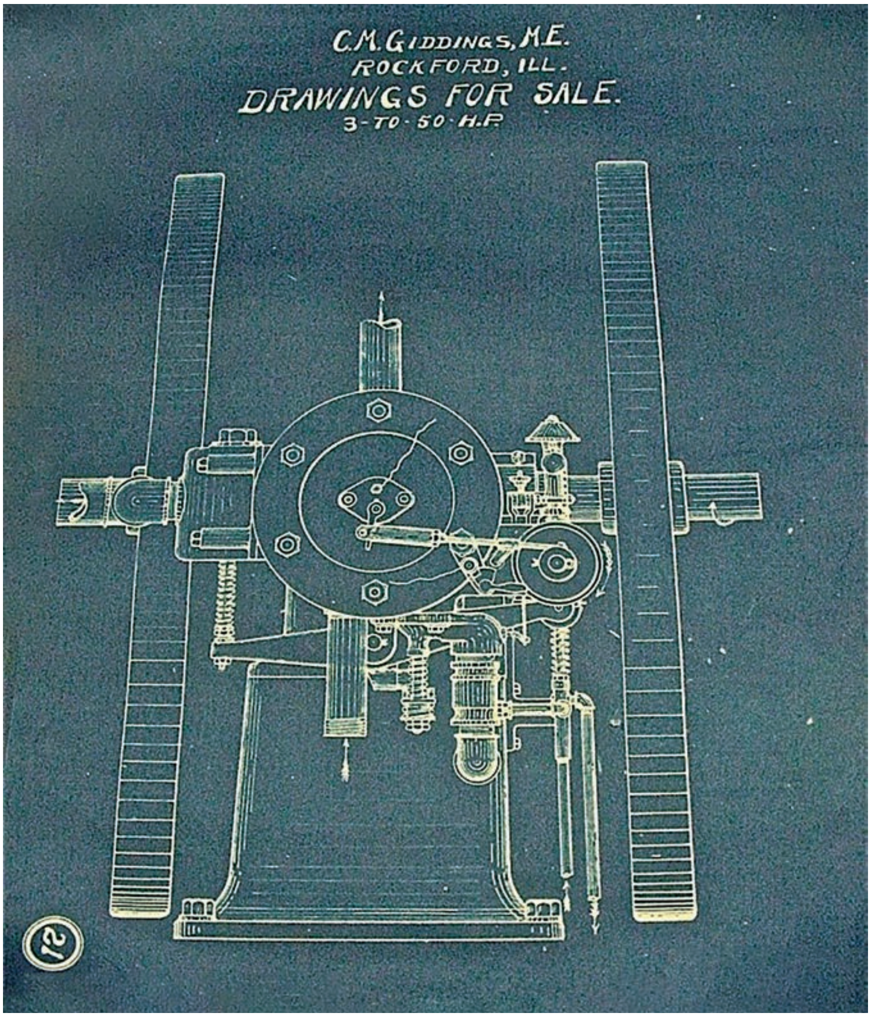
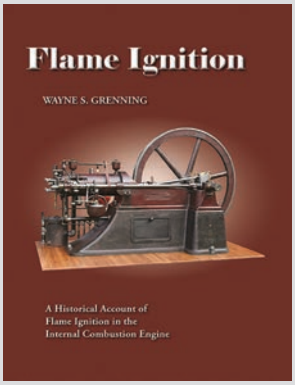
This vintage advertisement from Gas Power *magazine, 1904, boasts "Most popular engine on the market."*



A C.M. Giddings engine drawing.



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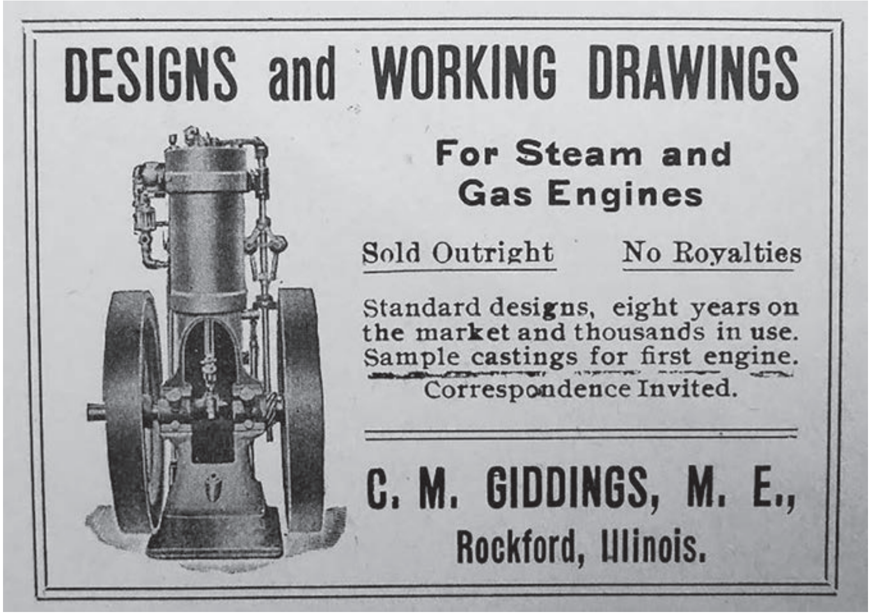
A Historical Account of Flame Ignition in the Internal Combustion Engine

This book is a scholarly work describing flame ignition as applied to reciprocating engines, from early experiments to later successes such as the Deutz and Crossley versions of the four-stroke cycle perfected by Otto in 1876. Author Wayne Grenning discusses problems encountered by the early entrants into the gas engine industry, highlighting solutions discovered by the various players. He also goes into more arcane subjects like the constant pressure cycle introduced by Brayton that survives today in the gas turbine engine, to a look at toy non-compression engines produced during the same early days as their full-size brethren. This title is available at Store.GasEngineMagazine.com or by calling 800-888-9098. Mention promo code MGEPANZ5. Item #10329.



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C. M. GIDDINGS, M. E.,
Rockford, Illinois.

This listing for C.M. Giddings' "designs and working drawings for steam and gas engines" portrays a vertical engine.

Clearly the following engine manufacturers were directly involved with F.M. Underwood, or inherited directly from a manufacturer that was directly involved with F.M. Underwood:

- The Lambert Gas & Gasoline Engine Co., formerly of Union City, later Anderson, Indiana
- The Buckeye Mfg. Co., formerly of Union City, later Anderson, Indiana.
- Frey & Scheckler of Bucyrus, Ohio
- The Comins Mfg. Co. of Upper Sandusky, Ohio
- The Ohio Gas & Gasoline Engine Co. of Bucyrus, Ohio
- The Underwood Motor Co. of Sandusky, Ohio
- The Sandusky Automobile Mfg. Co. of Sandusky, Ohio
- The Ohio Motor Co. of Sandusky, Ohio
- The Sandusky Foundry & Machine Co. of Sandusky, Ohio
- The F.M. Underwood Gas Engine & Motor Co. of Elmore, Ohio
- The Buckeye Engine Works of Elmore, Ohio
- The Buckeye Gas Engine Co. of Delta, Ohio
- The Toledo Motor & Machine Co. of East Toledo, Ohio

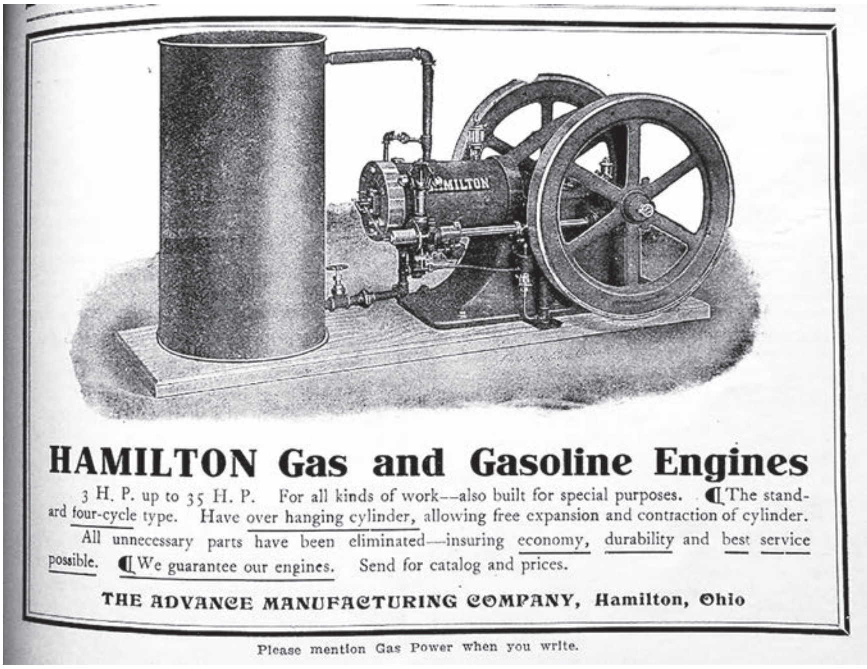
The engines that inherit from re-badgers that marketed Ohio Motor Co. engines:

- Palmer Bros, Cos Cob, Conneticut
- Kewanee Water Supply Co., Kewanee, Illinois
- Dean & Co. of Minneapolis, Minnesota
- S.B. Church Co., Seymour, Conneticut
- The National Engineering Co., Saginaw, Michigan
- Amherst Motor Co., Amherst, Nova Scotia
- The Lazier Gas Engine Co., Buffalo, New York
- The Joy-Willson Sales Co., Minneapolis, Minnesota; Alma, Michigan; Des Moines, Iowa; Baltimore, Maryland; Freeport, Illinois; Florence, South Carolina

In *Modern Machinery: Devoted to Machinery and Machine Tools*, C.M. Giddings reported that the design of his drawings had been built during the past four years, and by four well-known firms (although the article does not state that all four firms had been building for four years).

If C.M. Giddings did (as we suspect) draw his gas engine designs from F.M. Underwood, then my best guess when that relationship began would be sometime in 1896 or early 1897. Perhaps it could have begun about the time F.M. Underwood filed his patents in March 1895. Any engines that appear close in design to the Lambert/Underwood tradition and were built from about 1896 or later could have been built from C.M. Giddings' blueprints (derived from F.M. Underwood). These include:

- Advance Mfg. Co. of Hamilton, Ohio, circa 1898 and later.
- Earl Machine Works of Burlington, New Jersey, circa 1907.
- Emerson-Brantingham Co. of Rockford, Illinois, circa 1912 — Since C.M. Giddings and Emerson-Brantingham were both located in Rockford, Illinois, it is highly likely that Emerson-Brantingham built from a C.M. Giddings drawing.
- Rockford Engine Works, Rockford, Illinois, circa 1904 — Since C.M. Giddings and Rockford Engine Works were both located in Rockford, Illinois, it is highly likely that Rockford Engine Works initially built from a C.M. Giddings drawing.
- George D. Pohl Mfg. Co., Vernon, New York — These engines were late enough in time to have been taken from a C.M. Giddings drawing, but it may be more likely that they re-badged engines built by the Ohio Motor Co. of Sandusky, Ohio.
- Root & Vandervoort Engineering Co., Champaign, Illinois, later East Moline, Illinois — Since C.M. Giddings in Rockford, Illinois, is not far from Champaign, Illinois, and C.M. Giddings was definitely marketing engine designs similar to the Lambert/Buckeye/Underwood prior to the beginning of the R&V Engineering Co., it is likely the first R&V sideshaft engines were built from a C.M. Giddings drawing.
- St. Mary's Machine Co., St. Mary's, Ohio — Since C.M. Giddings was definitely marketing engine designs similar to the Lambert/Buckeye/Underwood prior to the founding of the St. Mary's Machine Co., it is certainly possible that the first St. Mary's sideshaft engines were built from a C.M. Giddings drawing. However, St. Mary's, Ohio, is not too far from Lambert/Buckeye in Anderson, Indiana, and it is at least equally likely that the Lambert design influenced the early St. Mary's design without any help from either F.M. Underwood or C.M. Giddings.
- Superior Gas Engine Co., Springfield, Ohio — Since C.M. Giddings was definitely marketing engine designs similar to the Lambert/Buckeye/Underwood prior to the founding of the Superior Gas Engine Co., it is possible that the first Superior engines were built from a C.M. Giddings drawing. However, is equally likely that the Superior Gas Engine Co. drew its design from the Foos Gas Engine Co., also of Springfield, Ohio.
- The American Engineering Co., Springfield, Ohio — Since C.M. Giddings was definitely marketing engine designs similar to the Lambert/Buckeye/Underwood prior to the founding of the American Engineering Co., it is certainly possible that the first American engines were built from a C.M. Giddings drawing. It is equally likely that the American Engineering Co. drew its design from the Foos Gas Engine Co. or the Superior Gas Engine Co., both also located in Springfield, Ohio.
- The Central Iron Works, Quincy, Illinois — Since Rockford, Illinois, is not far from Batavia, Illinois, and C.M. Giddings was definitely marketing engine designs similar to the Lambert/Buckeye/Underwood prior to the founding of the Central Iron Works, it is somewhat likely the Central Iron Works engines were built from a C.M. Giddings drawing.
- The Hydraulic Press Co., Mt. Gilead, Ohio — Author C.H. Wendell loosely associates the Hydraulic Press Co. with the year 1915, long after most manufacturers of this general engine design, and possibly after C.M. Giddings was actively selling drawings of this design. It is possible that the



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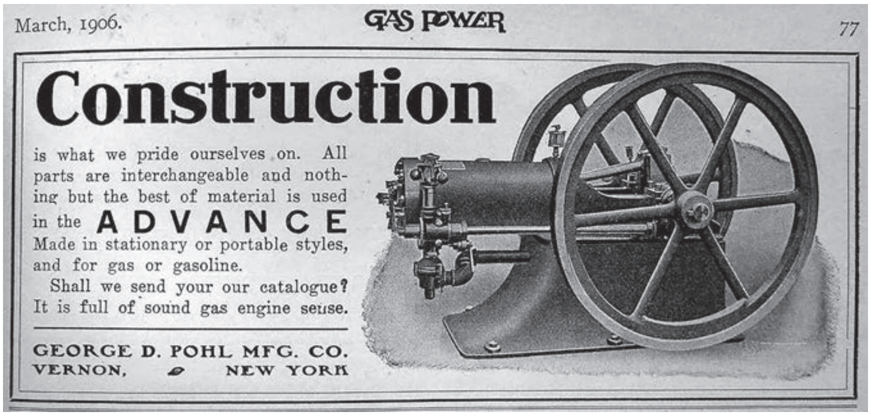

March, 1906. GAS POWER 77

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A 1906 Gas Power *magazine advertisement for the George D. Pohl Mfg. Co.'s Advance engine.*

Hydraulic Press Co. engines were actually re-badged Ohio Motor Co. engines.

- Parsons, Rich & Co., Newton, Iowa — The company offered both 2- and 4-cycle engines that closely match C.M. Giddings' advertised drawings, therefore it is likely that Parsons, Rich, & Co. built from C.M. Giddings drawings.

Although they offered engines of designs similar to the Lambert/Buckeye/Underwood designs, it is unlikely that the following engine manufacturers inherited anything from the Lambert/Buckeye/Underwood tradition.

- The Foos Gas Engine Co. of Springfield, Ohio – Although the Foos Scientific has several design features in common with the Lambert/Underwood design, the fact that Foos had patents as early as 1893, combined with its heritage of a wide variety of engine designs over many years makes it unlikely that there was any business relationship with F.M. Underwood.
- The C.P. & J. Lauson Co. of Milwaukee, Wisconsin – Although the Lauson Badger has several design features in common with the Lambert/Underwood design, C.H. Wendell indicates that the company's early models were built on a license arrangement from the Otto Engine Works of Philadelphia, making it unlikely that Lauson drew from the Lambert/Underwood design.
- The Southern Engine & Boiler Works of Jackson, Tennesee — The company's engines had some features such as the sideshaft, flyball governor, and igniter that are quite similar to the Lambert/Underwood design, and they came onto the market in 1906, well after C.M. Giddings began selling engine drawings. However, because of the unusual valve arrangement on the side of the engine opposite the sideshaft, it seems unlikely that there was any direct connection with either C.M. Giddings or F.M. Underwood.

This concludes my series on the gas engine building career of F.M. Underwood. If you have enjoyed reading it as much as I have enjoyed researching it, then we are both fortunate.

Sources: American Gas & Gasoline Engines Since 1872 Vol. 1, *C.H. Wendel, 1983;* American Gas & Gasoline Engines Since 1872 Vol. 2, *C.H. Wendel, 2006;* Gas Power, *1903-1904;* Modern Machinery: Devoted to Machinery and Machine Tools, Volumes 4 & 5, *January 1898;* Gas Engine Publishing Co., Volume 3, *January 1901.*

Will Cummings** is a regular contributor to* Gas Engine Magazine *and can be reached at* ***will.cummings1927@gmail.com.

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6hp Otto Gas Engine
6hp Otto Gas Engine
10hp Otto Gas Engine
15hp Otto Gas Engine
21hp Otto Gas Engine
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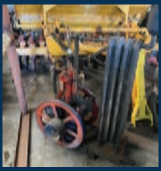

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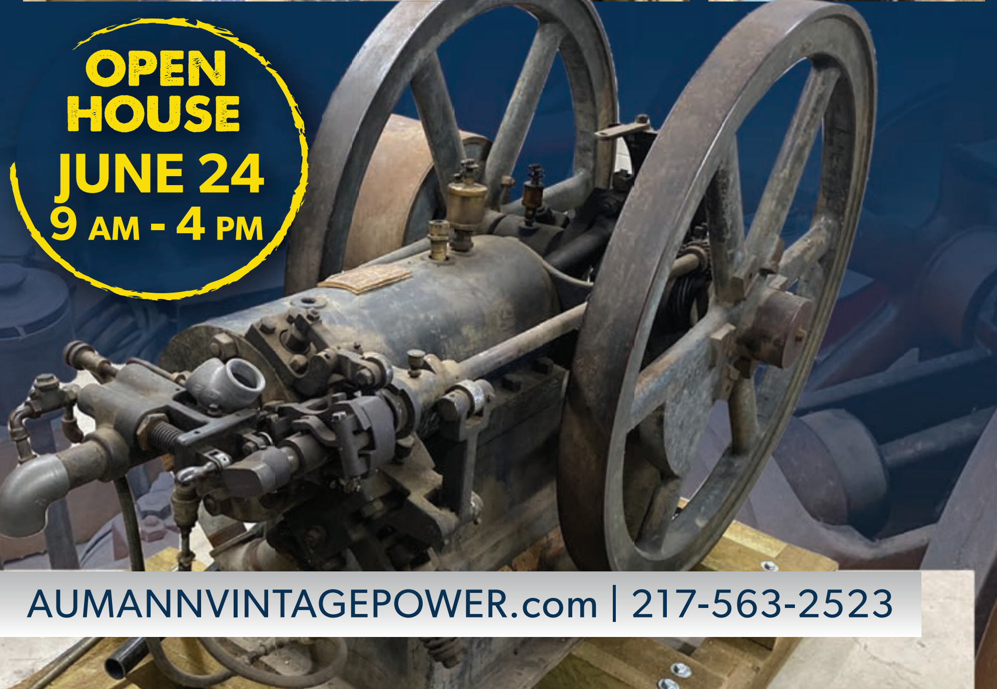

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7mm, red w/ black stripes	122	$2.52	$12.08	$21.00	$52.09
7mm, black w/ red stripes	121	$2.52	$12.08	$21.00	$52.09
7mm, yellow w/ black and red stripes	125	$2.52	$12.08	$21.00	$52.09
7mm, green w/ yellow stripes	120	$2.52	$12.08	$21.00	$52.09
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10 gauge, black w/ red stripes	98	$2.21	$11.03	$23.10	$32.81
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14 gauge, black	433	$2.00	$11.03	$23.10	$32.81
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Wico EK Magneto Instruction Book — #0081 $12.39. Same as above, in LARGER PRINT.
Wico PR Magneto Instruction Book — #0083 $9.87. Over 17 pages of PR information.
Witte Headless Engines — #0085 $12.08. 20 pages. Operation & repair on 1-1/2hp and larger.
Witte Throttle Governed Instructions — #0086 $13.23. Instructions & original parts list insert

Call or write for our FREE 180+ page color catalog with MANY more items!

Essex Brass Engine Oilers—Made in the USA

Size	1 1/2	2	3	4	5	6	7
Diameter of glass	1 3/4	2	2 1/4	2 1/2	3	3 1/2	4 1/4
Glass Height	1 5/8	1 7/8	2 1/8	2 3/8	3	4	5
NPT	1/4	3/8	3/8	3/8	1/2	1/2	1/2
Capacity OZ	1 1/2	2 1/2	4	5	10	Pint	Quart
Item #	#413	#414	#415	#416	#417	#2546	#2547
Price	$89.04	$89.04	$100.17	$100.17	$111.30	$150.26	$214.04

Essex Brass Drain Cocks—See EssexBrassParts.com or call for complete selection
Solid Brass, made in our plant.
Lever handle 90degree spout $16ea. 2 for $30 **1/8”**#3136, **1/4”**#3137, **3/8”**#3138, **1/2”**#3139
Lever handle strain spout $14ea. 2 for $24 **1/8”**#3140, **1/4”**#3141, **3/8”**#3142, **1/2”**#3143
Lever handle Male/Female fuel shut off $15ea. 2 for $26 **1/8”**#3144, **1/4”**#3145, **3/8”**#3146, **1/2”**#3147

Oiler Glass & Gaskets

Size	#0	#1	#1M	#1 1/2	#1 1/2M	#2	#2M	#3	#3M	#4	#4M	#5	#5M	#6
Diameter	1 1/4	1 1/2	1 5/8	1 3/4	1 3/4	2	2	2 1/4	2 3/8	2 1/2	2 3/4	3	3 1/8	3 1/2
Height	1 1/8	1 7/16	1 3/8	1 5/8	1 1/2	1 7/8	1 3/4	2 1/8	2 1/4	2 3/8	2 1/2	3	3 1/8	4
Item #	1342	1262	1982	941	1983	940	1984	939	2374	1118	2194	1107	2497	1117
Price	16.07	17.43	19.64	14.70	20.16	15.96	20.79	20.79	27.30	39.80	26.15	42.53	33.92	57.96
Gaskets for above oiler glass, Price per pair and ship free with any other item.														
Item #	957	956	956	955	955	954	954	953	953	952	2294	951	951	950
Price	3.15	3.68	3.68	3.78	3.78	3.99	3.99	4.31	4.31	4.41	4.41	4.41	4.41	4.62

Sight Glass & Gaskets

Diameter	1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8	5/8	5/8	3/4	3/4	3/4	3/4
Height	1/2	5/8	3/4	7/8	1	1/2	5/8	3/4	7/8	1	5/8	3/4	7/8	1
Item #	999	998	1092	1066	1000	1101	997	1095	1081	1098	993	1094	1096	1091
Price	11.13	11.13	11.13	11.13	11.13	11.13	11.13	11.13	11.13	11.13	11.13	11.13	11.13	11.13
Gaskets for above sight glass, Price per pair and ship free with any other item.														
Item #	2378					2379					2381			
Price	$2.21					$2.21					$2.21			

Sight Glass & Gaskets—Continued

Diameter	7/8	7/8	7/8	7/8	1	1	1 1/8	1 1/4	1 1/2
Height	5/8	3/4	7/8	1	7/8	1	1	1 1/8	1 3/8
Item #	1097	1100	1099	1093	1102	1103	1104	1106	1105
Price	11.13	11.13	11.13	11.13	11.13	11.13	13.34	13.34	13.34
Gaskets included for above sight glass, extras below, price per pair, ship free with any other item.									
Item #	2380				2376			2375	956
Price	$2.21				$2.84			$2.84	$3.68

Gasket Material

11 1/4” by 25 1/2” 1/32 thick Rubber fiber, Great for carbs, oilers valve covers etc.
$10ea 3 for $20 #1785

12” x 24” by 1/16” thick. Interface MP15. Great for hit & miss and small air cooled heads, exhaust flanges and more. Retails $100+ sq yard.
$12.00ea # 1255 3 for $24 #4490

Copper Crush Rings for ignitors and head gaskets

All crush rings have 1/8” cross section

1.25” ID	#3272	$12.18
1.5”ID	#2691	$13.34
1.625” ID	#2694	$12.18
1.75” ID	#3082	$12.18
2.25” ID	#3255	$13.97
2.5” ID	#3083	$13.97
2.625” ID	#3256	$13.97
3.25” ID	#3257	$13.97
3.5” ID	#2777	$13.34
3.75” ID	#3002	$13.97
4” ID	#2690	$13.97
4.125” ID	#3295	$15.02

John Deere

New Magneto w/ exchange	#3645	$500.00
Rare Earth Magnet	#3538	$124.90
Oil Pan 1.5 hp	#3743	$44.52
Oil Pan with cup 1.5hp	#3744	$70.67
Oil Pan 3 hp	#3745	$54.29
Oil Pan with cup 3hp	#3746	$76.23
Oil Pan 6 hp	#3747	$100.17
Oil Pan with cup 6hp	#3748	$128.00
Gas Tank 1.5 hp	#3717	$63.00
Gas Tank 3 hp	#3718	$73.50
Gas Tank 6 hp	#3719	$109.20
Complete Cart Kit	#3510	$383.25
Muffler 1.5-3 hp	#2499	$68.99
Muffler 6 hp	#3777	$86.84
Gasket Set Econ 1.5 hp	#1810	$50.09
Gasket Set Prem 1.5 hp	#3721	$69.62
Gasket Set Econ 3 hp	#2043	$66.78
Gasket Set Prem 3 hp	#3722	$87.89
Gasket Set Prem 6 hp	#3723	$122.43
Ignitor Rebuild Kit	#3692	$133.56
Check Valve	#1893	$22.26
Complete Fuel Line 1.5 hp	#2025	$36.23
Complete Fuel Line 3 hp	#2919	$42.84
Complete Fuel Line 6 hp	#3707	$47.88

Associated & Waterloo Style Check Valves

Straight	1/8”npt	#3200	$37.80
Straight	1/4”npt	#3201	$37.80
90 degree	1/8”npt	#3202	$37.80
90 degree	1/4”npt	#3203	$37.80

Mica Tubes & Washers

We stock a full selection of mica, call with your needs!

Retainers $3

Brass Oiler Fill Plugs		
5/16-24	#960	$6.00 3/$15
3/8-24	#961	$7.00 3/$18
7/16-24	#964	$8.00 3/$21
1/2-20	#963	$9.00 3/$24
9/16-24	#962	$10.00 3/$27

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Webster Tri-Polar Magnetos

Brass Name Bands $17.75 K/L #1304 M/MM #1303
Oilers for Websters 1/4” $4.41 Flip top. #1386
Press button #1384
Spring Roller 4pcs $17.22 #1298
Trip Roller $16.70 #1297
Terminal Block Cover, Brass. K,L $23.94 #1301
Terminal Block Cover, Brass. M,MM $23.94 #1302
Starting Handle. Fits M, K or L. $17.85 #1292
Brass bearing plate for M,MM,K,L $50.09 #2351
Coils K $100.17 #1294
Coils M MM $94.61 #1293
Springs Throttle Gov Pair $14.39 #1296
Springs Hit & Miss GovPair $14.39 #1295

Round & Flat Leather Belting

Size/Type	Item #	Price/ft
3/16 Round	2739	$3.15*
1/4 Round	2740	$3.15*
5/16 Round	2741	$3.47*
3/8 Round	2742	$4.83*
Clip for round belt	2743	$1.68*
1/2” Flat	2756	$5.88*
3/4” Flat	2757	$5.88*
7/8” Flat	2758	$5.88*
1” Flat	2759	$5.88*
1 1/4” Flat	2760	$7.25*
1 3/8” Flat	2761	$8.09*
1 1/2” Flat	2762	$8.82*
Lacing/inch	2763	$6.93*
Install lacing	2764	$11.13

Brass Grease Cups

#000	1/8npt	#2030	$19.53
#00	1/8npt	#2516	$31.19
#00	1/4npt	#2517	$31.19
#0	1/8npt	#651	$47.46
#0	1/8npt	#2419	$47.46
#1	1/8npt	#652	$58.59
#1	1/4npt	#2420	$58.59
#2	1/8npt	#2421	$70.67
#2	1/4npt	#653	$70.67
#2	3/8npt	#2422	$70.67

Tan Transmission Belting

Size	Item #	Price/ft
2”	4311	$5.88
2 1/2”	4312	$4.85
3”	3223	$7.02
4”	3224	$8.40

Check Valves w/ spring

Size Pipe x Tube	Item #	Price
1/8 x 1/8	#732	$17.33
1/8 x 3/16	#733	$18.27
1/8 x 1/4	#535	$16.17
1/8 x 5/16	#734	$19.01
1/4 x 3/8	#532	$17.12

Check Valve Female Pipe
1/8” npt #1935 $15.86
1/4” npt #1938 $15.86
Check Valve Female/Female
1/8” npt #1936 $15.86
1/4” npt #1937 $15.86

Quality Ignitor Points

One set of two ignitor points 1/8" dia. shaft 1/4" dia. head—#723 $7.98 a set.

Primer Cups—Solid Brass

#1 Bowl	1/8”	npt	#89	$22.26
	1/4”	npt	#90	$22.26
#2 Bowl	1/8”	npt	#2439	$22.26
	1/4”	npt	#91	$22.26
Tall	1/8”	npt	#657	$26.15
	1/4”	npt	#656	$27.30
Webster Primer Cup				
	1/8”	npt	#2825	$26.67

Wico EK

• Wico EK Brass Cover Band Set	#1795	$65.00
• Brass Front Plate w Stop Button	#0131	$23.00
• Brass Front Plate w/o Stop Button	#0137	$21.00
• Brass Rear Cover	#0138	$20.00
• Wraparound brass band	#0140	$30.00
• Nameplate w/Rivets	#0129	$11.50
• Coil Set	#0133	$128.00
• Leadout Twr w/Spring & Wire Clip	#0126	$11.28
• Condenser	#0128	$14.70
• Points set & felt wipers	#0127	$20.16
• Roller for Armature	#0252	$7.35
• Armature screw & nut	#1388	$10.40

Cast Iron Ball Mufflers Assembled with square head bolts

5” Dia	3/4”	Female NPT Thread	#2244	$65.63
	1”	Female NPT Thread	#2225	$65.63
7” Dia	1”	Female NPT Thread	#2226	$72.35
	1 1/4”	Female NPT Thread	#2246	$72.35
	1 1/2”	Female NPT Thread	#2248	$72.35
9” Dia	1 1/4”	Female NPT Thread	#2245	$77.91
	1 1/2”	Female NPT Thread	#2227	$77.91
	2”	Female NPT Thread	#2247	$77.91

Cast Iron Cone Mufflers Assembled with square head bolts

5” Dia	3/4”	Female NPT Thread	#2780	$72.35
	1”	Female NPT Thread	#2781	$72.35
	1 1/4”	Female NPT Thread	#2782	$72.35
10” Dia	1 1/4”	Female NPT Thread	#2783	$77.91
	1 1/2”	Female NPT Thread	#2784	$77.91
	2”	Female NPT Thread	#2785	$77.91

International LA LB Engine Mufflers Looks exactly like orig

1.5-2.5hp	3/4”	Male NPT	#1018	$24.47
3-5hp	1”	Male NPT	#1019	$26.99

International M Cast iron & assembled with square head bolts & nuts.

1.5hp	Smooth bore, w/ set screw	#1005	$61.16
3hp	Smooth bore, w/ set screw	#3078	$83.48
6hp	Smooth bore, w/ set screw	#2908	$122.43

Pressed Steel Ball Mufflers & Stover Assembled with rivets.

5” Diameter - Associated and United used these as well as many others

3/4”	Female NPT Thread	#1023	$44.10
1”	Female NPT Thread	#1024	$44.10

6” Diameter - Stover uses this size

3/4”	Male NPT Thread	#1008	$45.26
1”	Male NPT Thread	#835	$45.26
1 1/4”	Male NPT Thread	#822	$47.78

7” Diameter

1”	Male NPT Thread	#1346	$52.61
1 1/4”	Male NPT Thread	#824	$52.61
1 1/2”	Male NPT Thread	#823	$52.61

10” Diameter

1 1/2”	Female NPT Thread	#1009	$55.65
2”	Female NPT Thread	#1011	$55.65

Fairbanks Mufflers Pressed steel mufflers look just like orig

1.5hp Z & 3hp ZC	1”	Male NPT	#1022	$45.89
Headless	1 1/4”	Male NPT	#1020	$44.10
3hp (Not ZC)	1 1/2”	Male NPT	#1025	$51.45
6hp	2”	Male NPT	#429	$61.22

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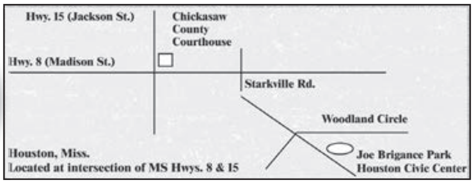

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800 A3 - 1 1/4" x 3/32"	6.00
800 A4 - 1 3/8" x 3/32"	6.00
800 A5 - 1 1/2" x 1/16"	6.00
800 A5A - 1 1/2" x 5/8"	6.00
800 A6 - 1 1/2" x 3/32"	6.00
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800 A7 - 1 3/4" x 1/8"	6.00
800 A8 - 1 7/8" x 1/8"	6.00
800 B1 - 2" x 1/8"	6.00
800 B2 - 2" x 3/16"	6.00
800 B3 - 2 1/4" x 1/8"	6.00
800 B4 - 2 1/4" x 1/8", oil	8.00
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800 B6 - 2 3/8" x 1/8", oil	8.00
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800 C1 - 3" x 1/8"	8.00
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800 C14A-3 9/16"x 1/4"	8.00
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800 C15 - 3 1/2" x 5/16"	8.00
800 C16 - 3 5/8" x 1/8"	8.00
800 C17 - 3 5/8" x 1/8", oil	9.00
800 C18 - 3 5/8" x 3/16"	8.00
800 C19 - 3 5/8" x 1/4"	8.00
800 C20 - 3 3/4" x 1/8"	8.00
800 C21 - 3 3/4" x 3/16"	8.00
800 C21A - 3 3/4" x 3/16", oil	9.00
800 C22 - 3 3/4" x 1/4"	8.00
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800 C23 - 3 7/8" x 1/4"	8.00
800 D1 - 4" x 1/8"	10.00
800 D2 - 4" x 3/16"	10.00
800 D3 - 4" x 1/4"	10.00
800 D4 - 4" x 1/4", oil	12.00
800 D5 - 4" x 5/16"	10.00
800 D6 - 4" x 3/8"	10.00
800 D7 - 4 1/8" x 1/4"	10.00
800 D7A - 4 1/8" x 5/16"	10.00
800 D8 - 4 3/16" x 3/8"	10.00
800 D9 - 4 1/4" x 1/4"	10.00
800 D9A - 4 1/4" x 1/4",oil	12.00
800 D10 - 4 1/4" x 5/16"	10.00
800 D11 - 4 1/4" x 3/8"	10.00
800 D12 - 4 1/2" x 3/16"	10.00
800 D13 - 4 1/2" x 1/4"	10.00
800 D13A - 4 1/2" x 1/4",oil	10.00
800 D14 - 4 1/2" x 5/16"	10.00
800 D15 - 4 1/2" x 5/32"	10.00
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800 D17A-4 3/4" x 3/16"	10.00
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800 D18A 4 3/4" x 1/4"	10.00
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FOR MORE INFORMATION CONTACT

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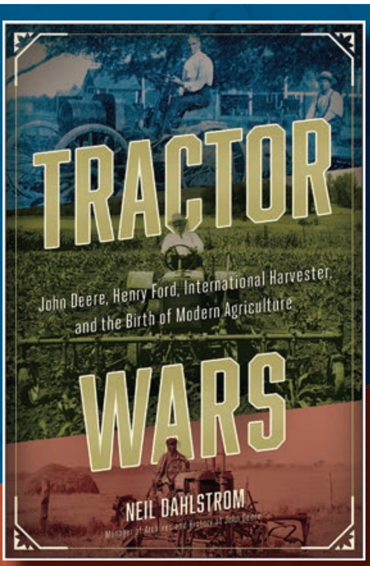

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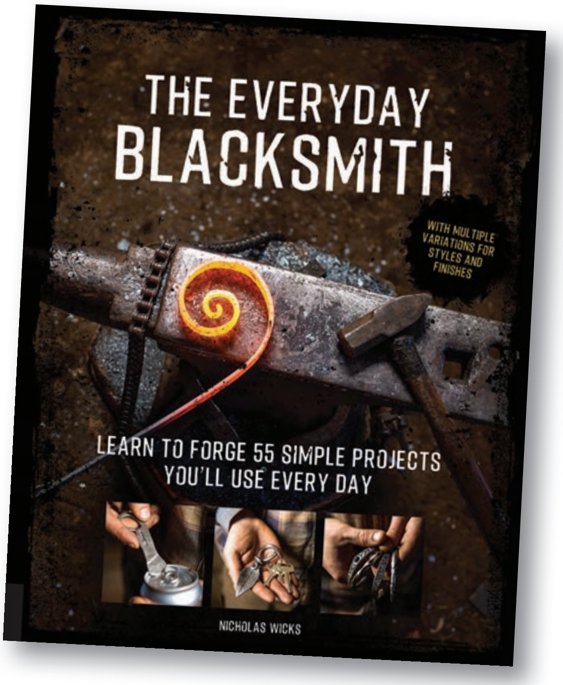
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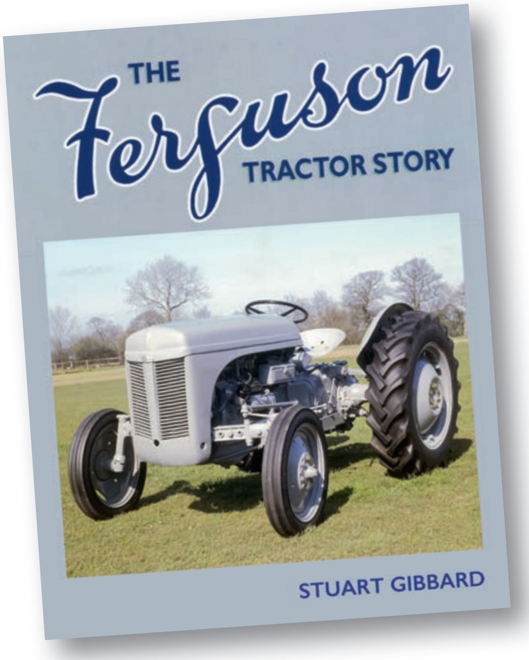
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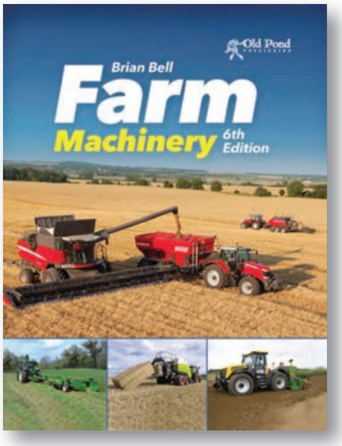
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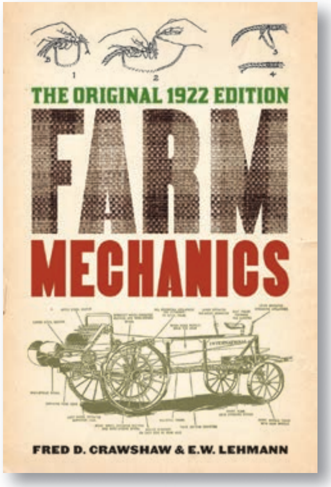
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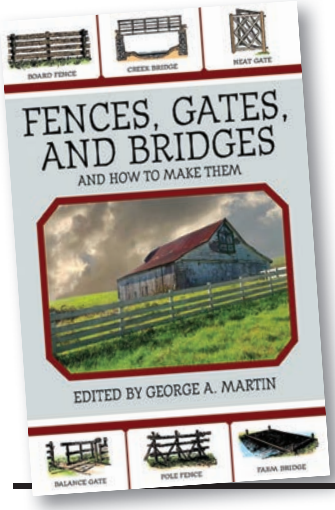
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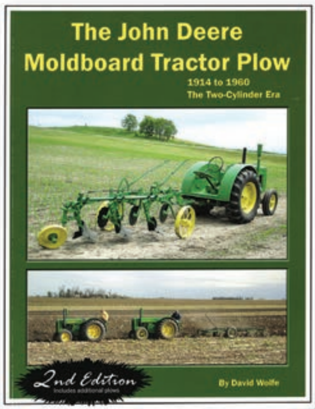
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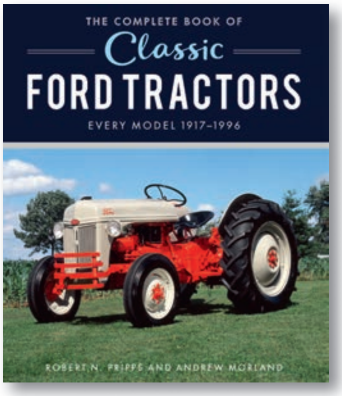
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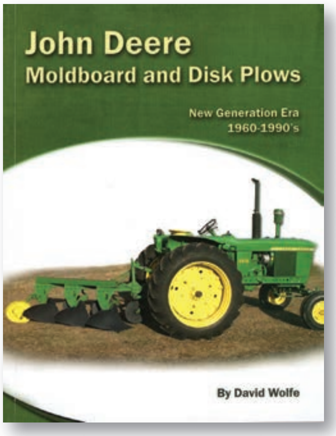
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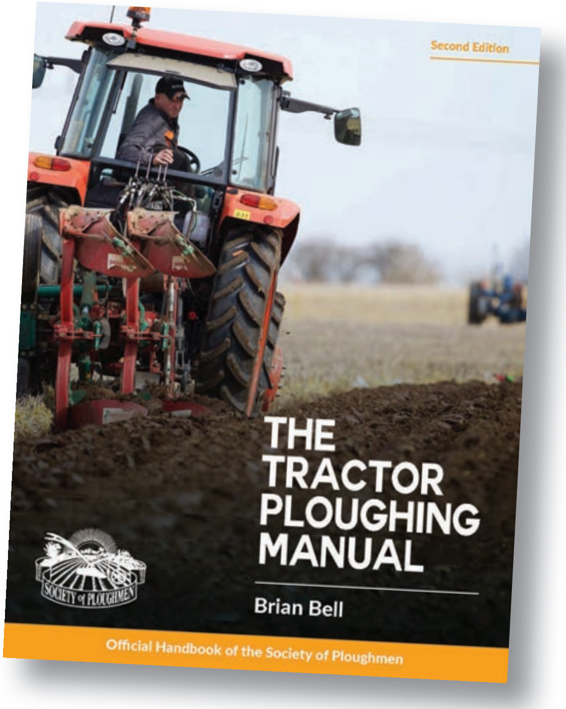
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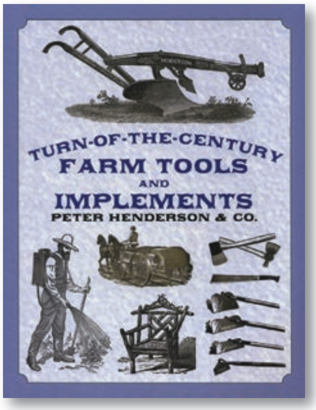
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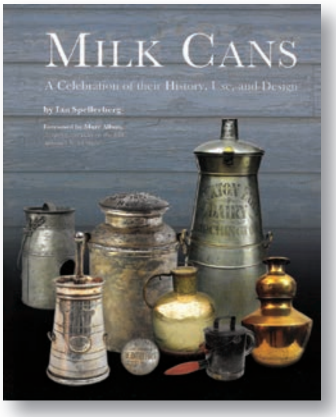
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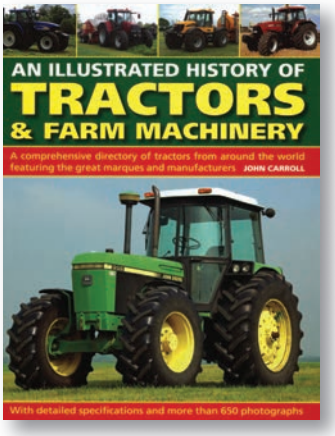
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With detailed specifications and more than 650 photographs

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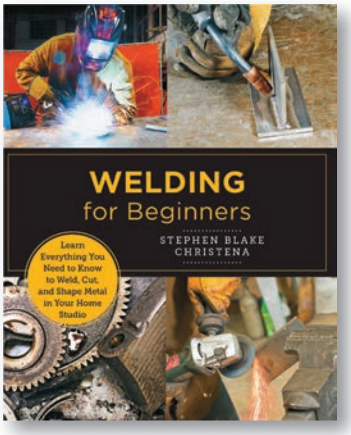
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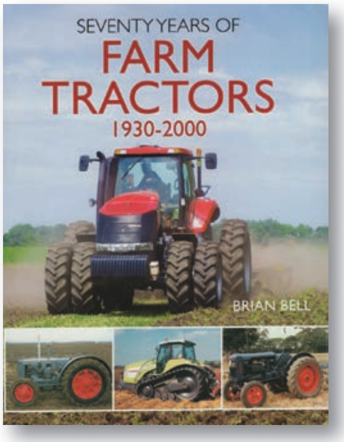
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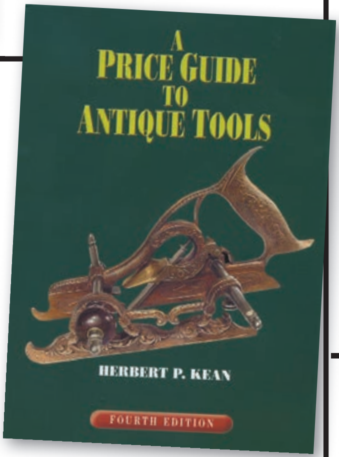
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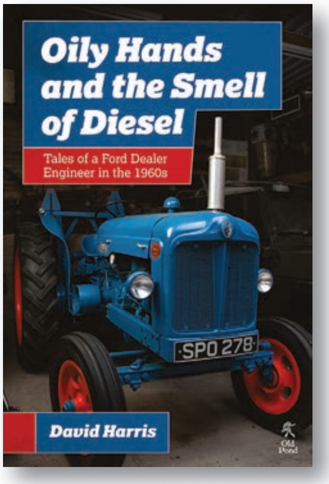
Oily Hands and the Smell of Diesel
Tales of a Ford Dealer Engineer in the 1960s
SPO 278
David Harris
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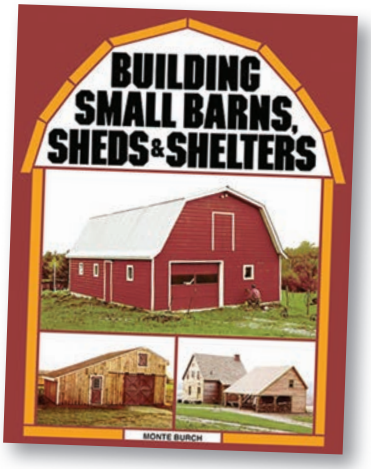
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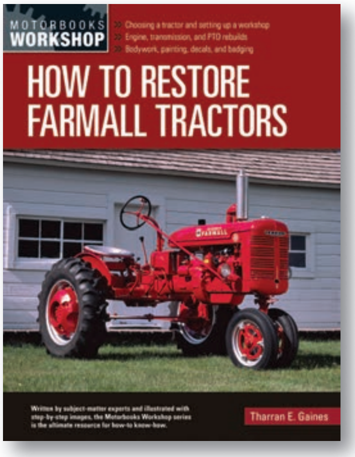
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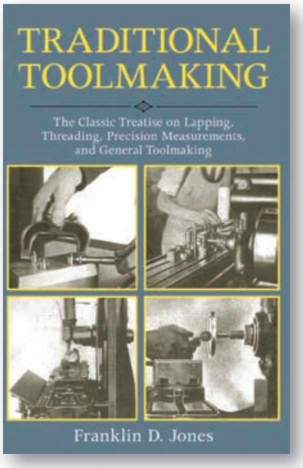
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52nd Annual Sandwich Early Day Engine & Tractor Show. June 23-24, 2023. Featuring Haish built engines (Appleton, Chanticleer, & Great Western), Rock Island IHC Tractors. Sandwich Tracor Ride June 23rd. Sandwich Fairgrounds, 1401 Suydam Rd., Sandwich, IL. Show info: Ryan 815-354-5549. Look us up on Facebook Sandwich Early Day Engine Club. Email - sandwichengineclub@yahoo.com, sandwichengineclub.com.

19th Annual American Farm Heritage Museum Farm Heritage Days. July 28-30 Greenvile, IL. Features: Prairie tractors & Oddballs and Orphans, and Sideshaft & Economy engines. Directions: 1395 Museum Ave, zip code 62246; I-70 exit 45, 45 miles east of St. Louis, turn south off interstate and make first left onto Museum Avenue. Contact: Brent Adkins, 217-836-4180; email: amheritagemuseum@yahoo.com Steve Loos, 618-667-9140. www.americanheritagemuseum.org Facebook: American Farm Heritage Museum.

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Michigan

Michigan Flywheelers Museum's Swap Meet and Flea Market. Friday, June 9th and Saturday, June 10th, 2023. South Haven, MI. Interested in selling? Registration starts Thursday, June 8th. No political items/weapons allowed. Call 269-639-2010 or go to www.michiganflywheelers.org for more info.

Minnesota

Minnesota: 46th annual Le Sueur County Pioneer Power Swap Meet, April 28-30, 2023. 6 miles east of Le Sueur, Minnesota. Expecting nearly 900 vendors. Free admission, vendors pay for inside or outside space. Website: PioneerPowerShow.com Info: Mike and Julie Bluhm, email: julieb5841@gmail.com. Phone: Home 507-934-5841 or Cell: 507-327-4927. Inside space info: Barb Bruns, 507-345-3750, email: barb.bruns2@gmail.com.

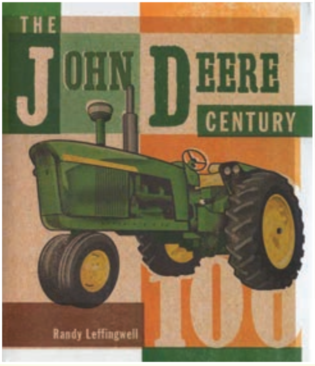
Oklahoma

Oklahoma Steam & Gas Engine Shows 56th Anniversary, Pawnee, Okla., May 5-7, 2023. Featured Tractor, Gas Engine and Garden Tractors:Rumely Products EXPO, Wheel Horse Lawn and Garden. Contact: Pawnee Chamber of Commerce, 918-762-2108; Angle Bengston (Arts & Crafts), 918-212-6511; Chuck Sittler (Flea Market), 918-798-4004; www.oklahomathreshers.org

West Virginia

Marshall Co. Antique Power Assoc. Presents: 28th Annual Gas Engine Show. June 22-24, 2023 at 422 Little Grave Creek Dr.,Glen Dale, WV 26038. Feature: Associated Engines and Associated Models. Call 304-845-7461 for more info.

THE JOHN DEERE CENTURY
JOHN DEERE THROUGH THE YEARS



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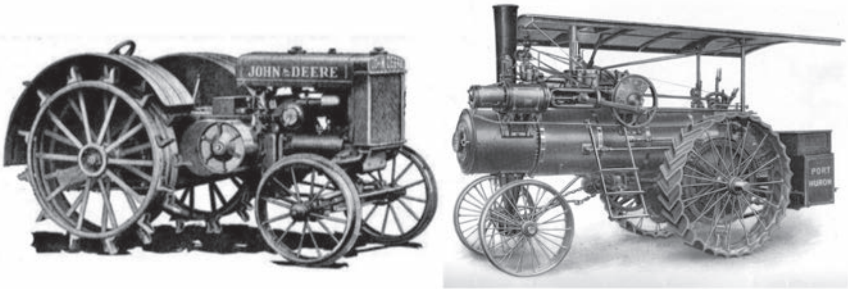

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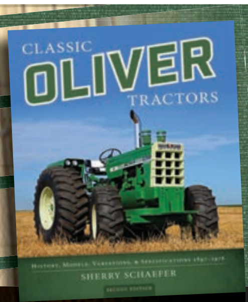

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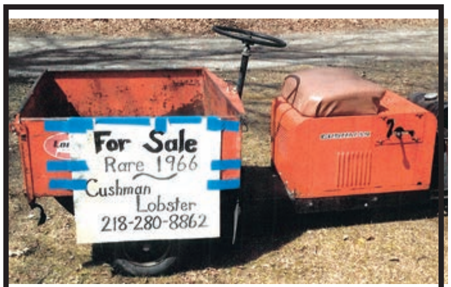

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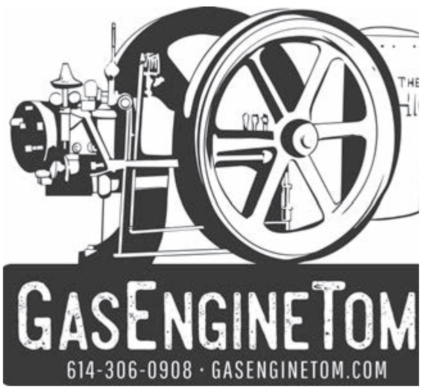
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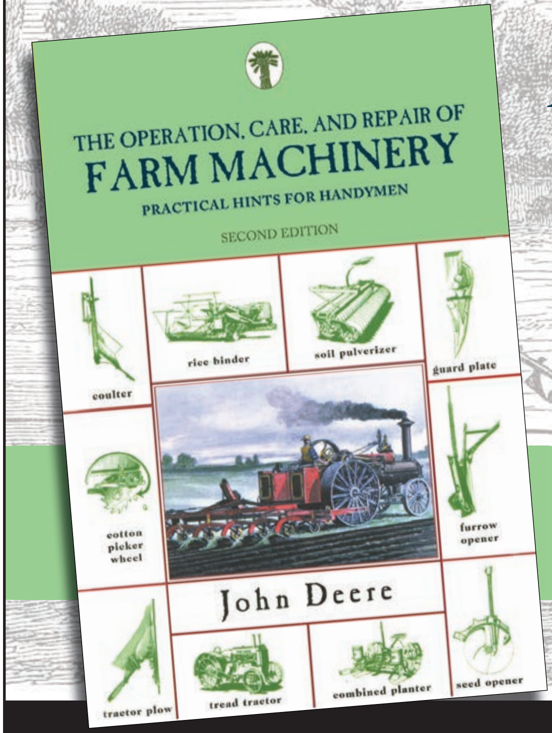
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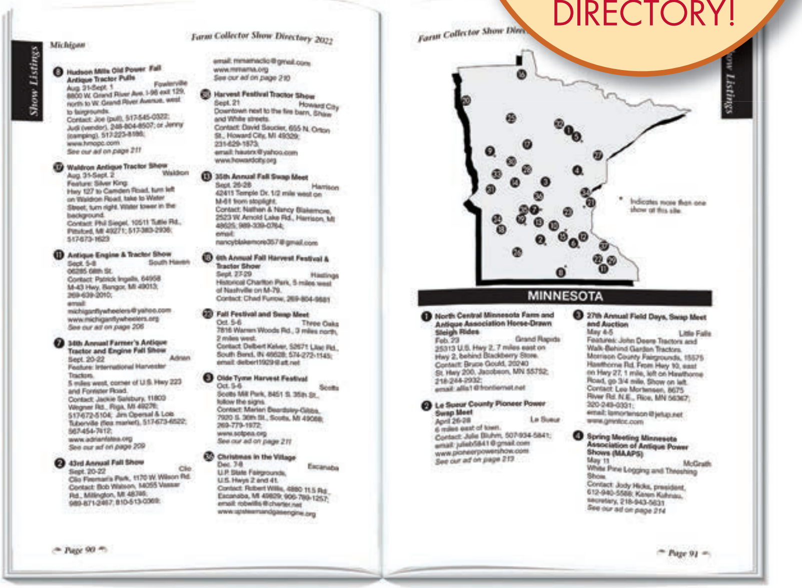
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